the OIL AND GAS JOURNAL

JANUARY 30, 1956

Annual

REVIEW-FORECAST

Number

Can oil look for a good '56?

Journal's editorial advisory board gives a resounding "Yes"

p. 116

How high are your drilling costs?

Check them with these averages from the first nation-wide study

p. 124

"what's HALLIBURTON doing in all these services?

There's a question with a double meaning. Your tone of voice determines the answer. If you're not using all of Halliburton's services you may be asking *why* we offer so many. The answer is—because *all* these services are important, necessary, and closely integrated. Each helps the other put more oil in the tanks.

If you *are* using all of Halliburton's services, you know about our great research program. You'll be asking what Halliburton is doing that's *new*. And the answer is—we are continually changing the old way of doing things. . .constantly improving and developing new tools, techniques, and technology . . . always making every effort to serve you better, day after day.

However you ask the question, Halliburton answers by performing SERVICE . . . service beyond the fee, service above all. And, above all, research is our most important service.

PROGRESS IN SERVICE THROUGH RESEARCH

OIL WELL CEMENTING COMPANY

DUNCAN, OKLAHOMA

A glance ahead . . . at press time

These trends will make TOMORROW'S NEWS

Sign of the times: The 30,000-bbl. refinery Commerce Oil Refining Corp. plans to build at Portsmouth will be designed to make premium gasoline to the exclusion of regular grade.

Moreover, with a high alkylate fraction, this fuel is expected to show a road octane rating of 99 with 2 ml. of lead and a research rating of 98. If this comes to pass, it will be a departure from most current high-octane fuels, which show lower road ratings compared to research.

The heavy budget appropriations for oil and other activities won't be so big when Congress gets through with them.

Traditionally, the federal agencies aim high to shoot low. And traditionally, Congress keeps its eye on the target and not the aim. Over all, it's a good bet that at least 5 per cent will be trimmed from the budget's non-defense items.

A much more stable summer market is in prospect for L.P.G. this year.

Colder-than-normal weather in the principal consuming areas has made this season the best in many years for L.P.G. producers. Pressure tank cars are in great demand and more would be used if available. The expected result: Lower stocks underground when spring comes—and a place to put what normally would be distress supplies next summer.

Don't wait until spring to cut refinery runs. Curtail them as soon as it's certain that this winter's heating-oil demands have been met.

This is the warning of many market observers. Their reason: Gasoline stocks are climbing at a much faster rate than a year ago. Higher stocks, of course, are needed because of an expected increase in demand. But right now it looks as if gasoline inventories will be well above the need within 90 days—if runs aren't cut.

The ammonia boom is still moving briskly—and will continue. Production jumped 25 per cent last year to 4,072,000 tons. Plants now building will add another 685,000 tons this year. Natural gas still dominates the field as a raw material, but heavy fuel oil and hydrogen from catalytic reformers are moving rapidly into the picture.

Look for an end this year to the remaining exports of U. S. crude oil to Canada. This flow—now 20,000 bbl. daily—is expected to be replaced soon by Canadian oil.

Throughout this year Canadian crude will find more and more outlets. Refiners in Canada will take 5 per cent more than last year, and the flow to U. S. markets is expected to more than double. In all, it will mean an increase in Canadian production of about 20 per cent.

The OIL AND GAS JOURNAL

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ANNUAL REVIEW-FORECAST

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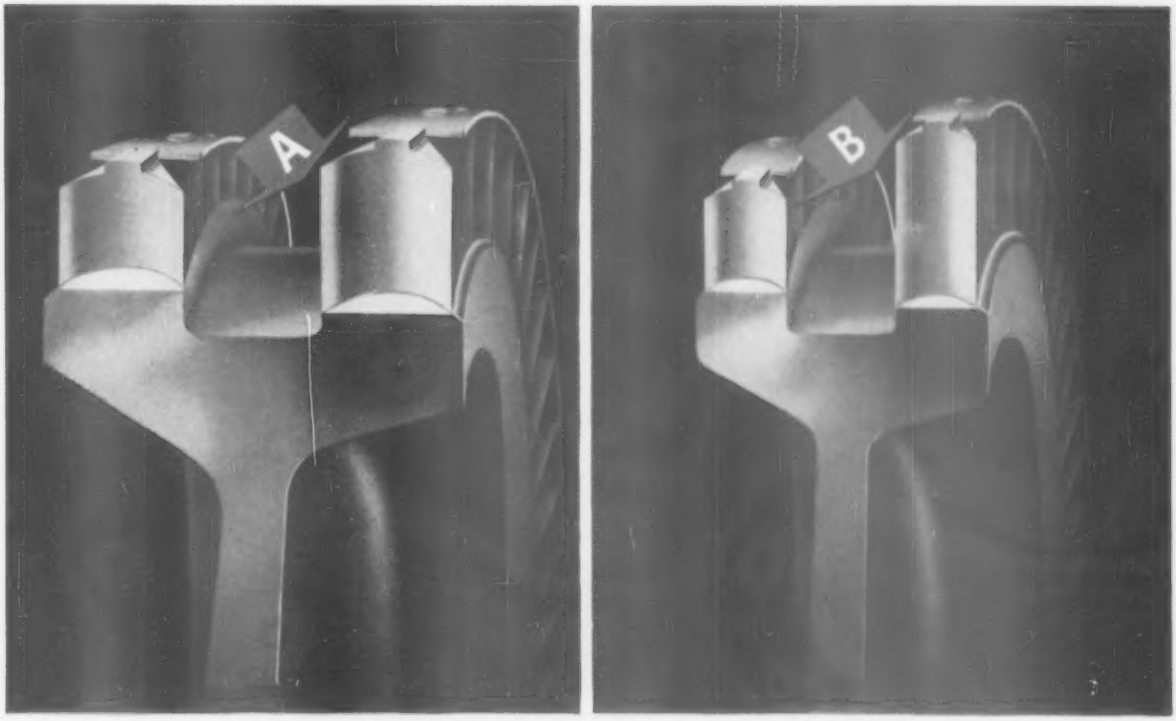

(Left, A) wide bucket "L" type wheel. (Right, B) regular type wheel for Coppus Steam Turbines

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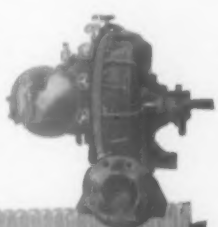

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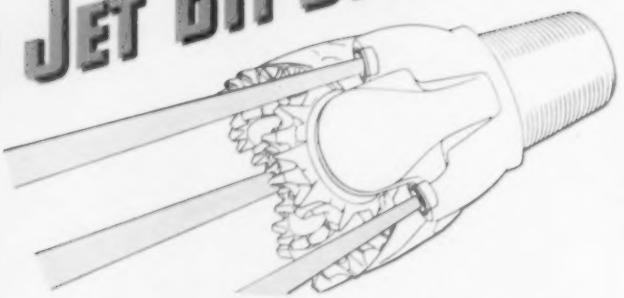

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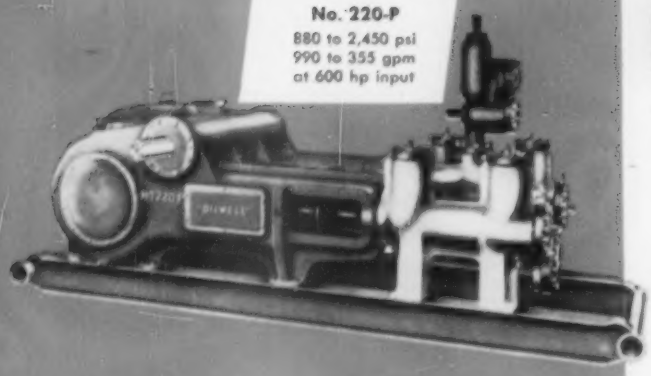

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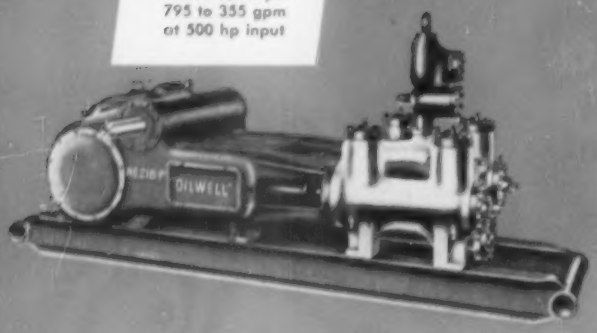

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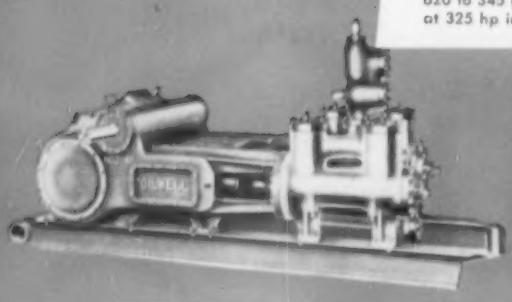

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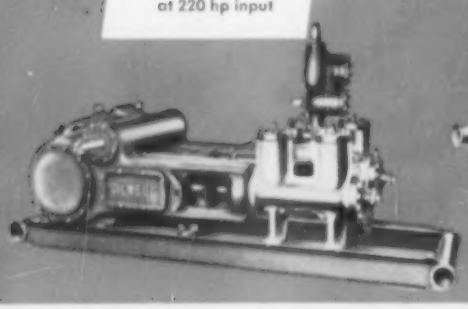

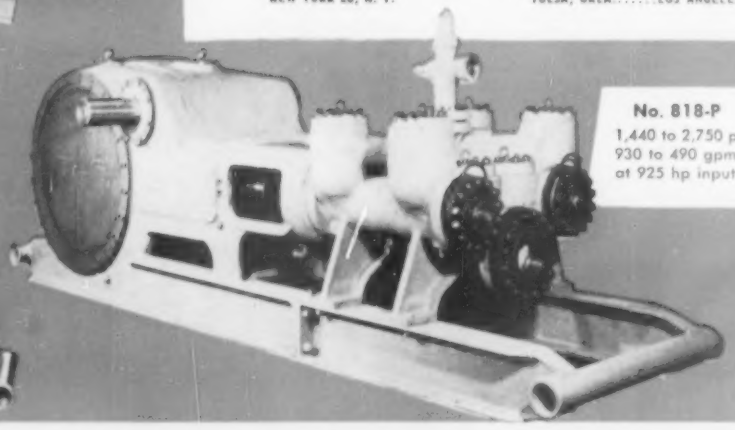

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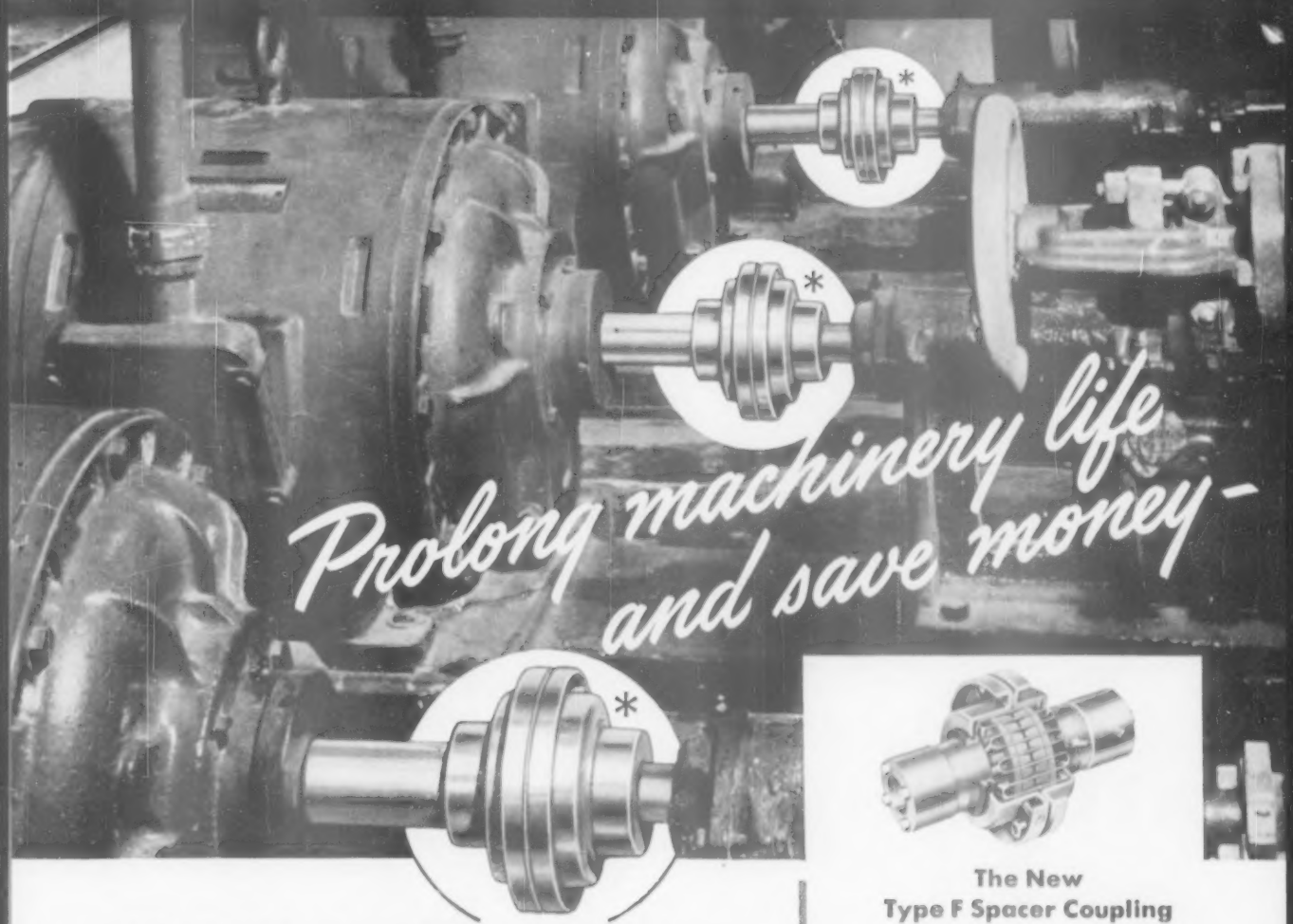

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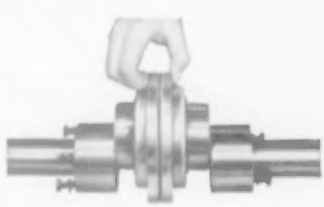

The Steelflex Spacer coupling is prelubricated at the Factory and can be installed, or removed and reinstalled, without disturbing the lubricant—a highly desirable feature.

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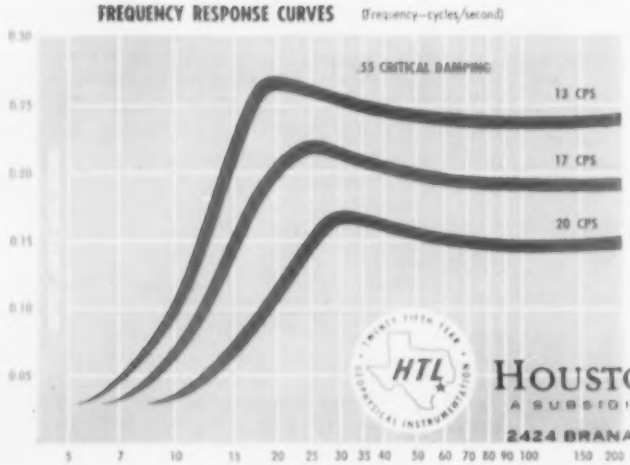

Specifications

Weight	11 oz. (With cap and spike)
Height	1⅞ inches
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Natural Frequency	13, 17, 20 cps optional
Coil Resistance	500 ohms
Internal resistor for 0.55 critical damping	390 ohms (20 cps) 470 ohms (17 cps) 620 ohms (13 cps)

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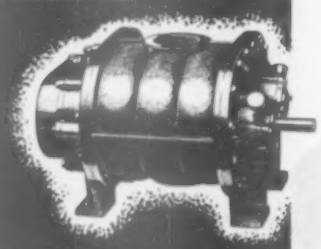
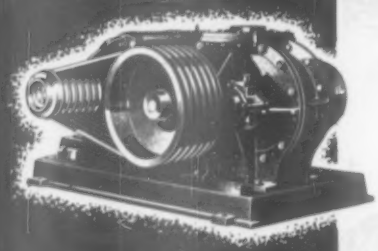
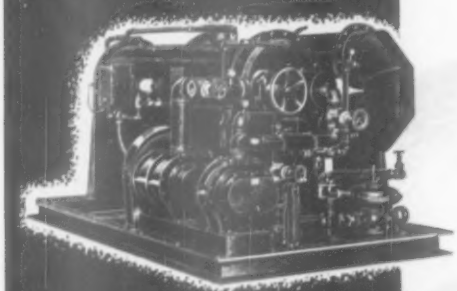


BLOWERS for such widely varying needs as lifting a damaged airplane or injecting air into water to provide oxygen for safe transportation of fish in tanks. Capacities as low as 5 cfm or up to 100,000 cfm or higher.



GAS PUMPS for inflating balloons, manufacturing electronic tubes or extracting gases from contaminated areas for test samples. They'll deliver as little as 5 cfm or as much as 50,000 cfm or more.

METERS help save money or make more profits by accurately measuring almost any kind of gas which you buy, sell or use in manufacturing processes. "Cash register accuracy" from 2,000 to a million cfh.



INERT GAS GENERATORS make hazardous operations safer from fire or explosion. They protect people, plants and products . . . and often return more than they cost in reduced insurance premiums. They'll produce inert gas for almost any use. You can have as much as 50,000 cfh or as little as 1,000 cfh in mobile or stationary equipment.

How to pull DOLLARS out of the AIR

New ways to put air (or gas) to useful, profitable work are constantly being developed by engineers and designers. These result in more effective machines and devices—frequently replacing slower or more expensive methods—often reducing the first cost of the equipment itself. These results are accomplished . . .

by resourceful engineering

In many of these applications, designers and engineers have utilized standard R-C equipment, sometimes with special adaptations. The problem may call for a small or large volume of air, moved by R-C Blowers or Exhausters. It may require vacuums, produced by R-C Vacuum Pumps. Perhaps metering or pumping of gas is needed, also met by R-C products. In any event, the solution is often . . .

aided by Roots-Connersville experience

If you use or build for resale any product which might be improved by utilization of air at moderate pressures, by vacuums or by moving gas, perhaps we can help you. Even if you have only the ghost of an idea that might pull dollars out of the air, we'll gladly work with you.

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Product Development Manager, Roots-Connersville Blower Division, 156 Oak Avenue, Connersville, Indiana.

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INDUSTRIAL HOSE LINES
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Make field repairs quickly with this simple attachment of hose to KAMLOK shank type adaptor and coupler by using hose clamps. Leak-proof, light weight, easy to handle.

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KAMLOK'S POSITIVE SEAL ALL ALONG THE LINE ASSURES GREATER SAFETY IN HANDLING ALL TYPES OF LIQUIDS. Excellent hose has been condemned too often because of inferior couplings. To eliminate twisting, kinking, and straining, to add extra life and endurance to your hose use a good coupler . . . use KAMLOKS. Available in any combination to meet coupling requirements in sizes from ¾" to 4" inclusive. Sizes ¾" through 4" of special hard wear-resistant bronze and OPALUMIN*. 1" through 4" of monel. 1" and 2" (633A and 633B only) of stainless steel.

*OPW bi-tensile aluminum alloy.

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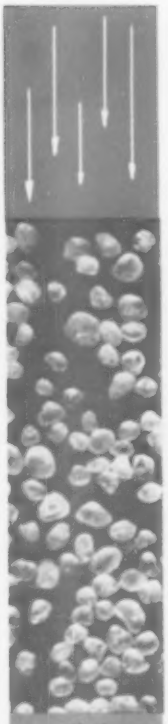
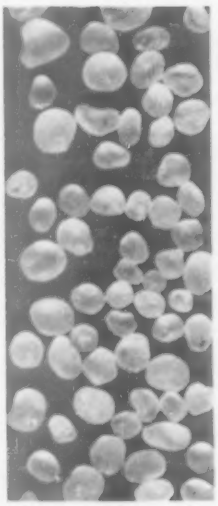
propping agents provide MORE PERMEABLE PATH





20-40

10-30

10-20

HALLIBURTON'S FRACTURING SERVICES

Longer, sustained production appears to be greatly aided by use of effective propping agents in the created fractures. Without these "props" a combination of elasticity and force components act to "heal" a fracture and permit closure which results in loss of flowing capacity. The most obtainable and economical propping agent so far established is sand.

Today's standard sand is the result of many tests and field trials extending in type from screened river sand to the present clean, carefully graded, rounded grain silica. In this classification Ottowa Sand, 20-40 U. S. Standard mesh is most frequently used.

A more permeable path for fluid flow is provided and preserved by the use of the propping agent employed in Halliburton's 6 Fracturing Services and 3 Technique Variations...

HYDRAFRAC	VIS-O-FRAC	EMULSIFRAC
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For further details on these production improvement techniques call your local or district office of the Halliburton Oil Well Cementing Company.

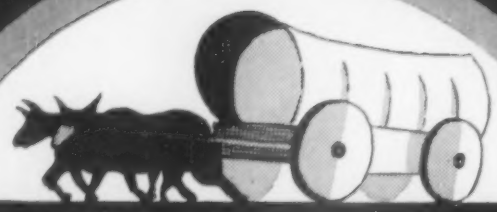
COMPLETE DATA SENT ON REQUEST

Get this valuable information for your Halliburton Service File.

HALLIBURTON FRACTURING SERVICES

250 SERVICE CENTERS—JUST MINUTES AWAY FROM ANY RIG

PATENT CHEMICALS, INCORPORATED



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Dyes for gasolines, greases, waxes and industrial products
Petrol Ero Blue for Aviation gasoline
This material meets Mil-F-5572 Specification

Manufacturers of fluorescent indicator for F.I.A. absorption method hydrocarbon analysis. 'Petrol' Red AB4, a specially developed red dye for gasoline marking to meet Mil-F-5572 specifications. 'Petrol' colors for gasoline, kerosine, Diesel and tractor fuels. • 'Greasol' colors for greases. • 'Stero' colors for waxes.

Patent Chemical Company specializes in petroleum problems and preparation of particular products to meet special requirements involving dyes; fluorescent colors; additives; blooming, wetting, dispersion agents, etc.

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Fuel Oil Additives
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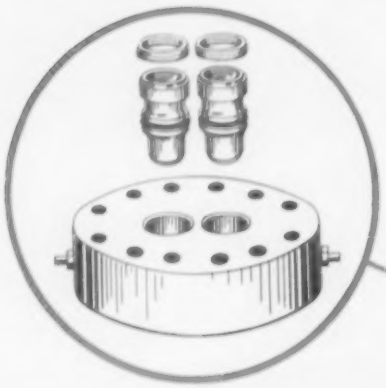
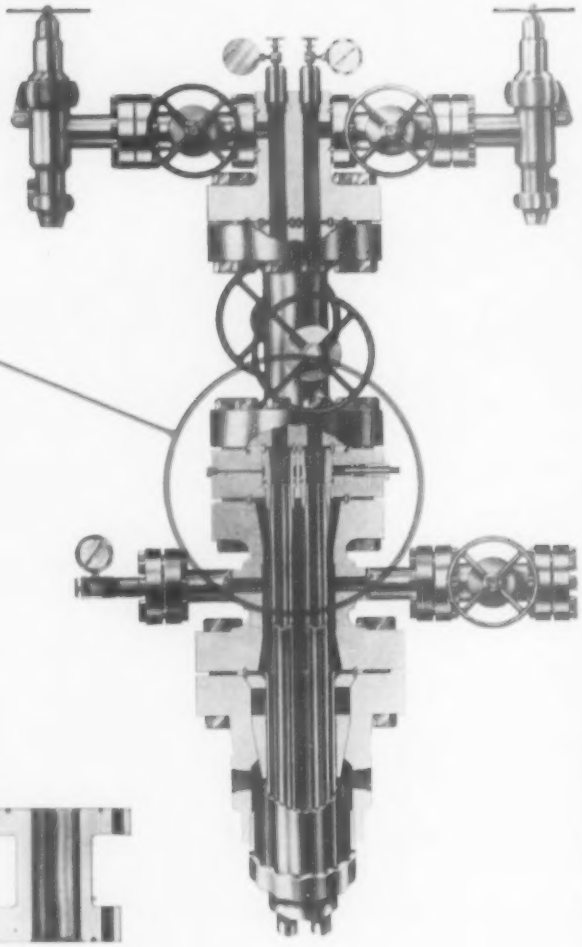
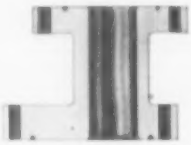
RECTOR Dual-String Hanger Flange

Outstanding Simplicity and Flexibility, plus the FAMOUS Rector Metal-to-Metal Seal







SIMPLICITY: The flange has two full opening tapered bores in which the strings are suspended by threaded mandrels. This eliminates mating and sealing two tubing hangers in a single, large bore. Each string can be suspended, temporarily sealed, and held down independently of the other assuring maximum ease of installation with complete control of well.

FLEXIBILITY: Regular 2" API upset tubing can be run or pulled through the bores in the flange.

METAL-to-METAL SEALS: Each mandrel is independently sealed by a metal seal ring in the groove at the junction of mandrel and flange. This metal-to-metal sealing arrangement also acts as a hold-down. "O" Rings on the mandrel provide a temporary seal during completion and permit testing the seal after Christmas Tree is installed. Mandrels are grooved for hold-down locking screws, which are optional in the flange.

• **Rector Dual-String Hanger Flanges are available in Nom 6 and Nom 8 sizes in any series. Mandrels are interchangeable.**

For maximum simplicity and flexibility of dual-string suspension, plus the metal-to-metal seal that never requires maintenance or replacement, specify a Rector Dual-String Hanger Flange in your dual completion Christmas Tree.

Off-Set Adapter Spool permits use of regular preventer equipment with alignment directly over each individual bore while running and pulling tubing. After first string is run, Adapter Spool can be rotated to center directly over the other bore.

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Best today...better tomorrow. For more than 60 years of specialized manufacturing experience...through the development of the most important firsts in the business, Jones has put together the knowledge, plant and machines to produce the best sucker rods and couplings you can use.

We're still not satisfied! Today and tomorrow, our engineers and researchers in field and factory are working to better our products. Our goal is your satisfaction.

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10 times more microwave power gives

EXCLUSIVE WITH PHILCO! Ten times more transmitter power in Philco CLR-7 Microwave systems . . . with a degree of performance and reliability never before attained in microwave equipments.

Heart of the Philco system, the "Power House" Klystron, generates a full watt of power (10,000 watts ERP) in the preferred 6000-7500 mc band.

This Philco CLR-7 Microwave power results in a received signal 10 times stronger—a higher safety margin to overcome adverse propagation conditions.

Philco CLR-7 Microwave equipment can be installed in minimum space... employs reliable, long-life tubes, a positive frequency control system and is completely compatible with existing wire line and two-way radio facilities *and with any type multiplex equipment.*

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the "Long Haul"

THAT COUNTS!

you advantages like these:

- 160% greater maximum hop distance
- Fewer microwave relay stations
- 10,000 watts effective radiated power—
  50% smaller antennas
- Reduced tower installation costs
- 10 db additional signal safety margin

Philco CLR-7 Microwave repeater . . . rugged! compact! reliable! Built to provide continuous, trouble free service over short or long hauls.

Philco "Power House" Klystron provides the highest equipment power output available in the preferred 6000-7500 megacycle band.

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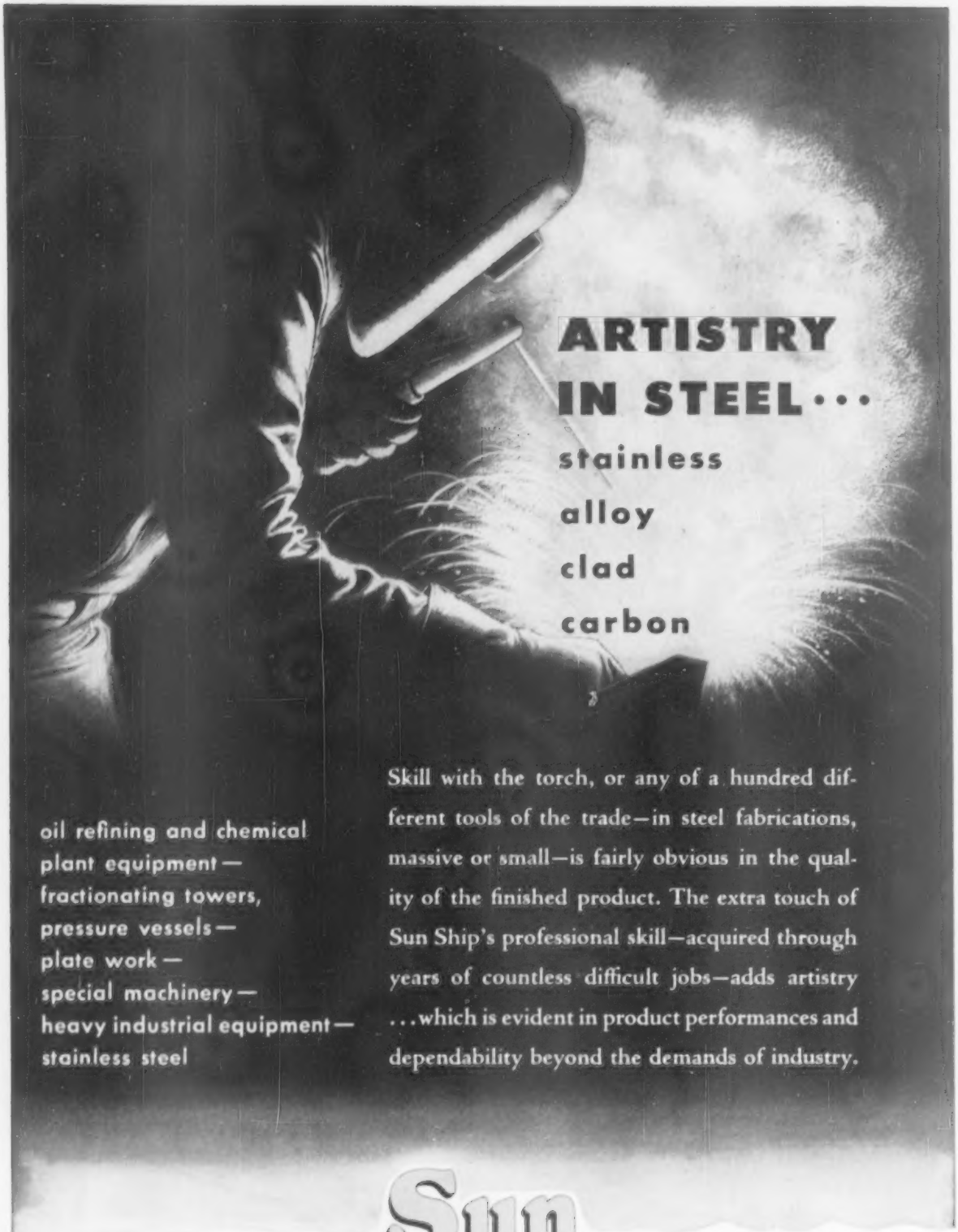
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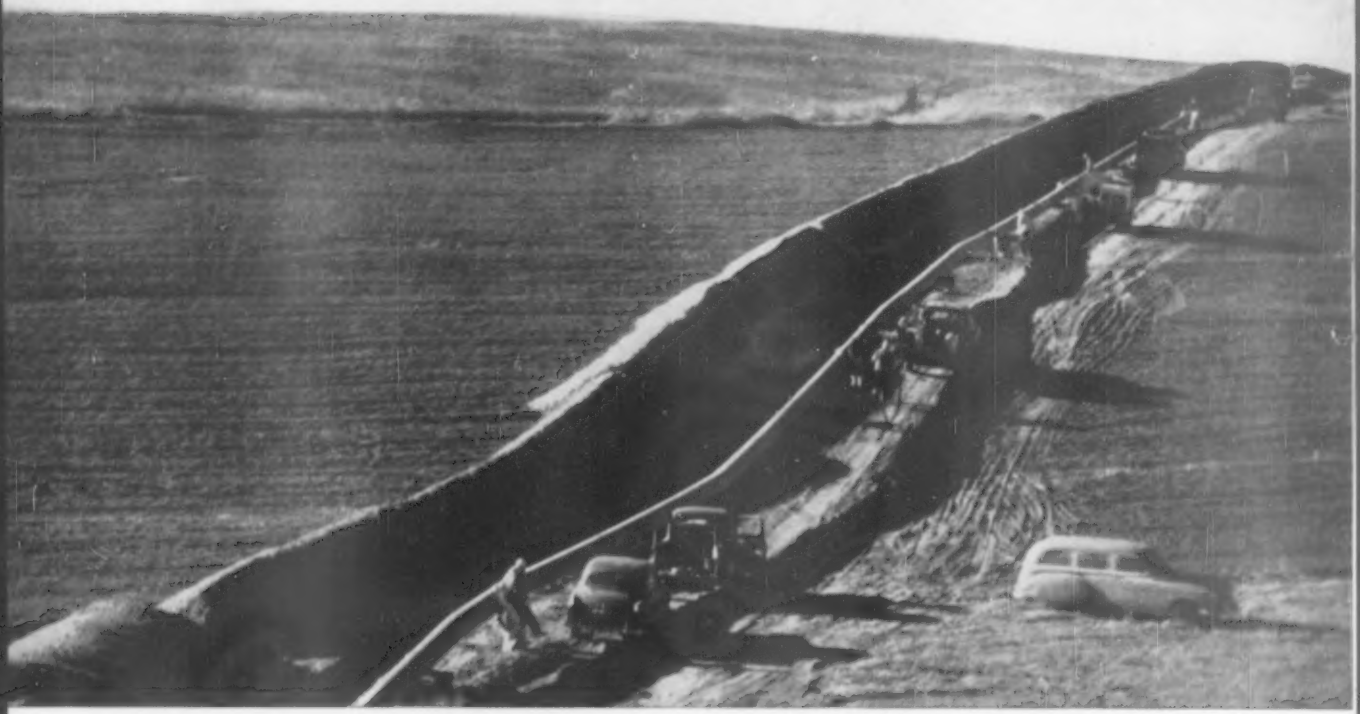
85 YEARS OF PROGRESS WITH THE OIL INDUSTRY

SERVICE PIPE LINE'S



Pipe welders at work on the rolling fields of Kansas.

A watertight pulling dome or "head" welded onto the line in preparation for one of the eight major river crossings.

A section of 24" O.D. x .500" wall National Seamless Pipe, coated for the Solomon River crossing. The covering consisted of a dope primer impregnated with fibre glass paper and coated with two inches of cement.

NATIONAL SEAMLESS PIPE AND TUBES

625-MILE "BIG INCH"

from Wyoming to Missouri contains 45,000 tons of NATIONAL SEAMLESS

USS National Seamless Pipe—45,000 tons of it—in sizes 20", 22", and 24" O. D. are now helping to carry millions of barrels of crude oil from the Rocky Mountain producing areas to midwest refining centers.

Starting at Fort Laramie, Wyoming, the new line runs through the Denver-Julesburg Basin of Colorado and Nebraska and is linked to west Kansas producing fields. It ties into Service Pipe Line Company's main North-South system at the western edge of Missouri.

The present outlet capacity is 160,000 barrels per day. It can be economically expanded to 245,000 barrels per day. Initially, more than 1,500,000 barrels of oil were required to fill the line.

The installation of this line brought about a new pipe-laying record—an average of over 10 miles a day. Eight spreads welded as high as 108.6 miles of pipe in one week, and up to 17.4 miles in a single day! This is a tremendous accomplishment in view of the fact that the line passes under 49 highways, countless roads, 21 railroads, eight major rivers, and spans innumerable irrigation ditches.

This type of rugged service calls for exceptionally strong, uniform, flexible pipe that will endure crushing underground and underwater stresses. And most important – it must be pipe that can be depended upon to give long, trouble-free service. This is USS National Seamless Pipe, "Walls Without Welds" . . . and these are the reasons why it is chosen so consistently to do the job.

A cinch bending machine in operation on a section of National Seamless in the Boyd, Kansas, area.

"WALLS WITHOUT WELDS," the vivid story of the manufacture of National Seamless Pipe and Tubes is available free of charge for showings to industrial groups, clubs, school groups, etc. This educational sound film in brilliant technicolor contains some of the most dramatic steel mill operations ever recorded. Write to Motion Picture and Visual Aids Section, United States Steel Corporation, 525 William Penn Place, Pittsburgh 30, Pennsylvania.

In Pipe Lines Too . . . Seamless Does It Better

SEE The United States Steel Hour. It's a full-hour TV program presented every other week by United States Steel. Consult your local newspaper for time and station.

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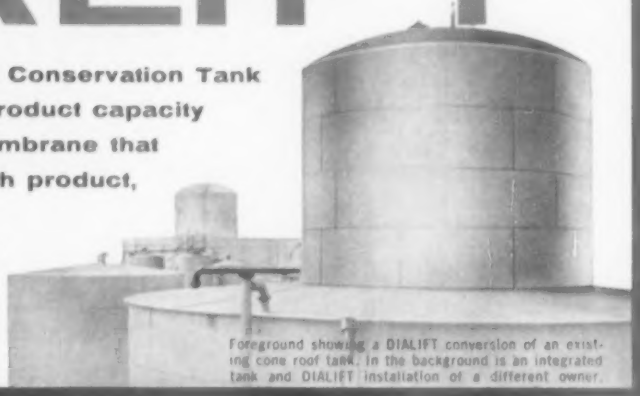
USS

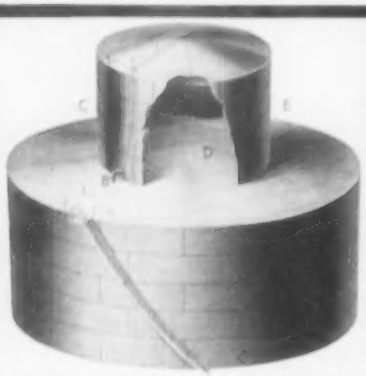
UNITED STATES STEEL

The HAMMOND DIALIFT

The ONLY membrane type Conservation Tank with full-rated vapor and product capacity AT ALL TIMES, with a membrane that cannot come in contact with product, vapor space that can be isolated for inspection and maintenance without taking product storage tank out of service.



Foreground showing a DIALIFT conversion of an existing cone roof tank. In the background is an integrated tank and DIALIFT installation of a different owner.



Principle of the Hammond Dialift

- A. DIALIFT DIAPHRAGM rises and falls to accommodate expanding and contracting vapor.
- B. Vapor passes to and from tank and DIALIFT through simple elbow connection.
- C. DIALIFT and tank have full-rated capacity.
- D. Membrane can't come in contact with product.
- E. DIALIFT can be isolated for maintenance and inspection, product tank stays in service.

The most efficient and economical vapor conservation system for new or old tanks.

THE HAMMOND DIALIFT consists of a gas-tight Vulcalock membrane attached to the inside periphery of a cylindrical metal housing to become a "breathing" apparatus to accommodate the expanding and contracting vapor as developed in product storage tanks. The DIALIFT can be used as a single conservation unit by being attached to the roof of a product storage tank or as a central "breathing" system by being manifolded to a number of product storage tanks. There are two forms of installation: —Ground type manifolded to a number of tanks to form a conservation system and integrated type whereby the DIALIFT is attached to the roof of a product tank for vapor conservation for one or a number of tanks.

The DIALIFT is completely isolated from the product storage tank. Vapor passes between the tank and DIALIFT through a vaporline connection. It is easy to convert old cone roof tanks to efficient vapor-saving DIALIFT installations by attaching a DIALIFT housing with membrane to the roof of the old tank and connecting the vaporline between the tank and DIALIFT.

New or converted DIALIFT tank, inter-connected with cone-roof tanks, becomes central "breathing" unit.

DIALIFT GROUND UNIT serves as central "breathing" apparatus of multi-tank conservation system.

THE HAMMOND DIALIFT ELIMINATES BREATHING LOSS AND REDUCES FILLING LOSS

Write for catalog 55DL

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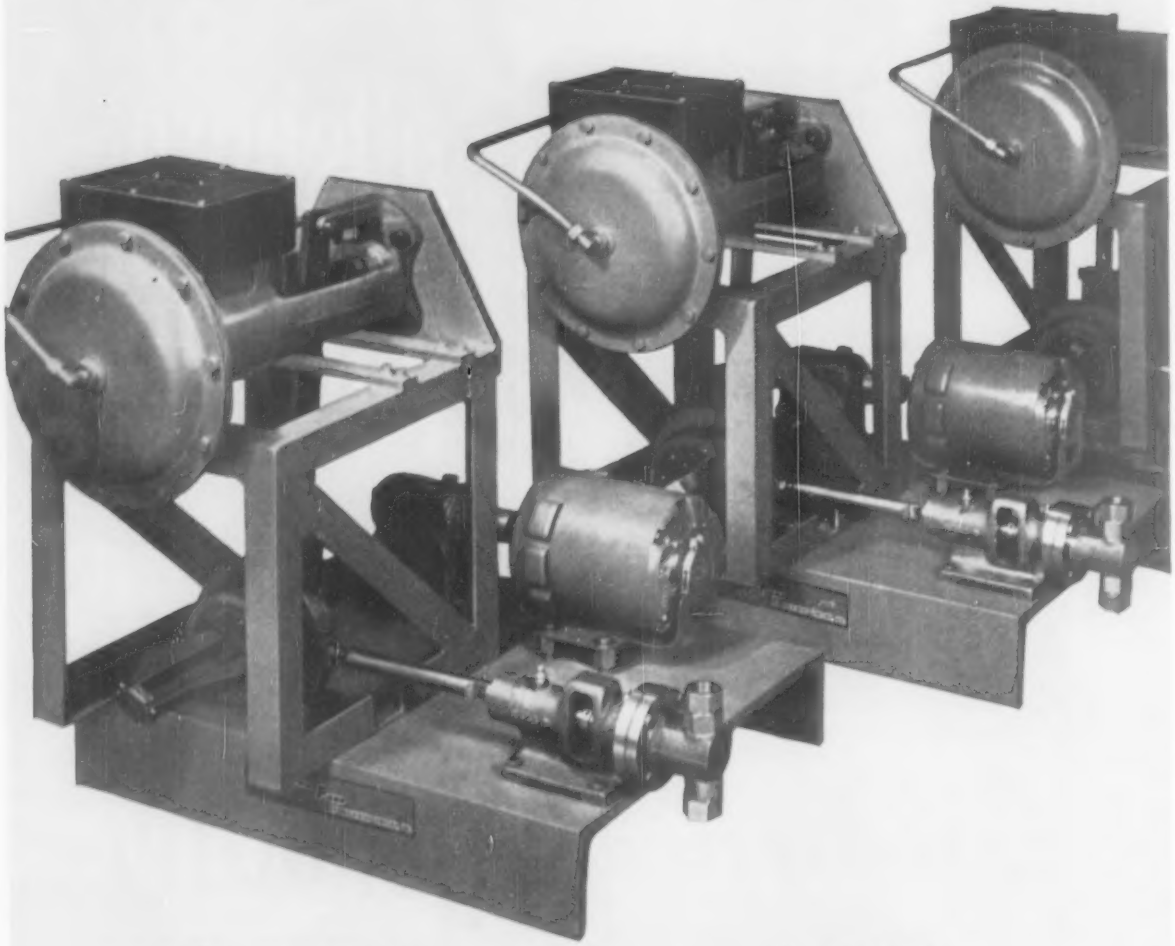
Pumping Corrosion Inhibitors..



..with metering accuracy of 0.2%

thanks to **PHILATROL***

AUTOMATIC CAPACITY CONTROL

* Illustrated, pneumatically motivated with built-in square root extractor requiring 3 to 15 lb. signal. Also available electrically motivated—50 or 100 ohm slide wire. Hydraulically motivated —50 to 100 p.s.i. hydraulic fluid.

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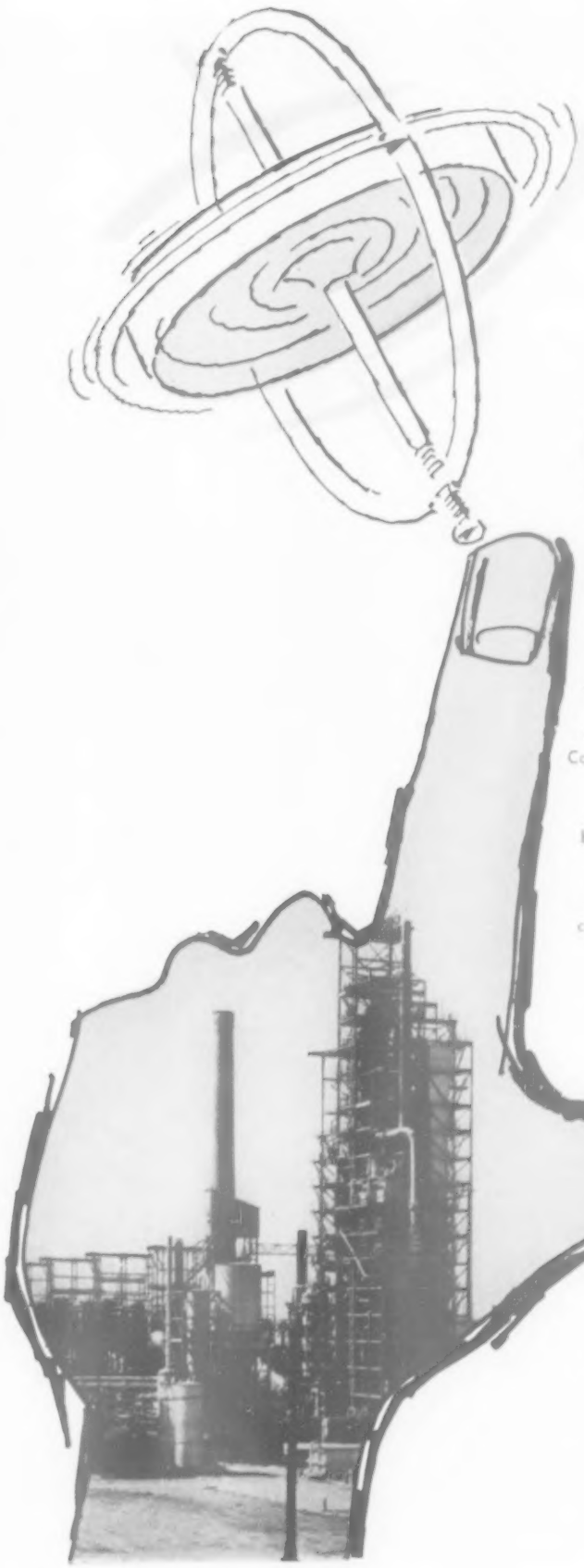

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Require stability, too . . .

and with Davison's *LOW DENSITY* catalyst you get commercially proven higher stability. You get a higher degree of thermal stability without affecting the resistance to attrition or other proven qualities of Davison catalysts. Commercial fluid cracking units, operating for over one year, demonstrate that this stability leads to:

Higher surface area—Higher pore volume—Higher pore diameter—Higher catalytic activity—Improved regeneration

This new *LOW DENSITY* catalyst is yet another Davison catalyst manufactured with controlled catalyst characteristics. At Davison you can get the catalyst best suited for your unit. For information on Davison's new *LOW DENSITY* catalyst, as well as other Davison catalysts, see your Davison representative or write.

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How to pick the 1 tubing steel out of 24 to give you longest tube life per dollar

Ask the experts!

OF THE 24 different high-temperature tube steels the Timken Company offers to solve your heat, pressure, corrosion and oxidation problems, *one* analysis is most exactly suited to your particular needs, to give you maximum tube life per dollar of cost.

To find this analysis, *ask the experts.*

These experts are the metallurgists of The Timken Roller Bearing Company. The benefit of their more than 20 years of steel research and experience—with emphasis on high-temperature steels—is yours for the asking. They'll help you select the analysis that will give you longest tube life for your money—the only true measure of actual tube steel cost.

Whichever analysis you choose, you can be confident of uniform quality. The Timken Company maintains rigid quality control from melt shop through final inspection.

Why not let the Timken Company's metallurgists help pick the tubing steel that can solve *your* problem? *Ask the experts!* The Timken Roller Bearing Company, Steel and Tube Division, Canton 6, Ohio. Cable address: "TIMROSCO".

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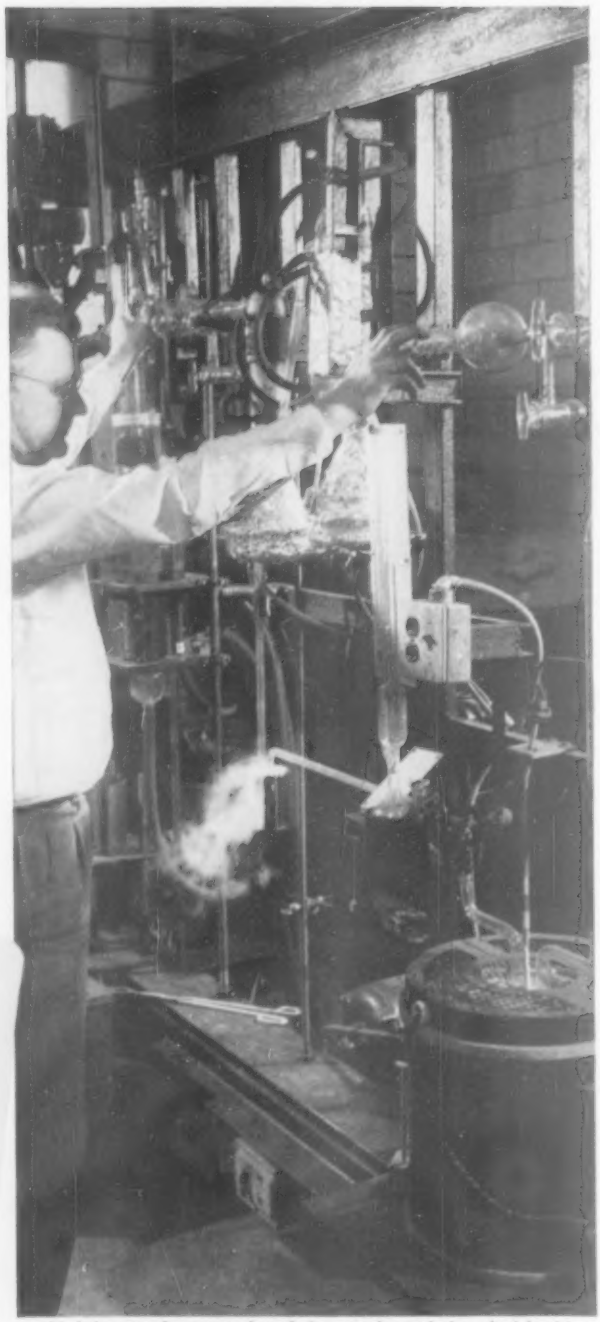
18-8 STAINLESS

An austenitic, non-magnetic alloy that shows the best combination of creep strength, oil corrosion resistance and oxidation resistance for service up to 1500°F. For use in oil cracking systems, hydrogenation equipment, high temperature oil and steam piping, superheater elements, heat exchangers.

ONE OF 24 TIMKEN HIGH TEMPERATURE STEELS

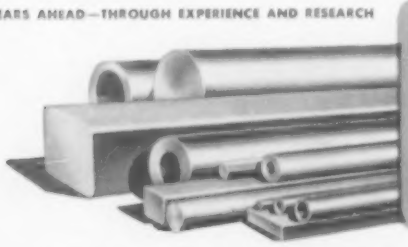
Carbon	Sicromo 2	Sicromo 5S	18-8Ti
Carbon-Mo.	Sicromo 2½	Sicromo 5MS	16-13-3
DM-2	2½% Cr.-1% Mo.	Sicromo 7	25-20*
Silmo	Sicromo 3	Sicromo 9M	25-12*
DM	4-6% Cr.-Mo.	18-8 Stainless	35-15**
2% Cr.-Mo.	4-6% Cr.-Mo.-Ti	18-8 Cb	16-25-6**

* *Available as seamless tubing on an experimental basis only.*
** *Not available as seamless tubing.*



To help control exact steel analysis, a steel sample is melted in this vacuum fusion apparatus. Then gases are pumped out, and the amount present in the steel is determined.

YEARS AHEAD—THROUGH EXPERIENCE AND RESEARCH



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CONTINENTALS GIVE YOU ALL THE THINGS that add up to DEPENDABLE POWER

QUALITY assured by more than 50 years' experience in specialized internal combustion power.

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SPECIALIZATION that does away with hit-or-miss matching to the job.

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PARTS INTERCHANGEABILITY for quick replacement, with minimum down-time.

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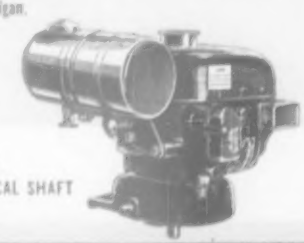
AUTHORIZED SERVICE and genuine Red Seal parts available from coast to coast.

By standardizing on Continental Red Seal engines in the oil field, you get ALL THE THINGS that add up to dependable oil field power. There's a Red Seal model engineered and built for almost every application in drilling, processing, and dozens of standby uses. Overhead-valve and L-head models for use with all standard fuels are available as bare engines or as power units, open or closed. Ask your oil field supply store or write for full information.

IN ADDITION TO ITS LARGE ENGINES, Continental builds an outstanding line of heavy duty air-cooled four-cycle models for industrial and farm applications requiring 2 to 3 h.p. Advanced engineering gives them easy starting, high dependability, and unusual lugging capacity at low speeds . . . Options: patented and exclusive Contex® external ignition system, low-level ignition cut-off, 6-1 reduction gear, and other features. Available also for use on kerosene . . . For information on these models, address Air-Cooled Industrial Engine Division, 12800 Kercheval Ave., Detroit 15, Michigan.



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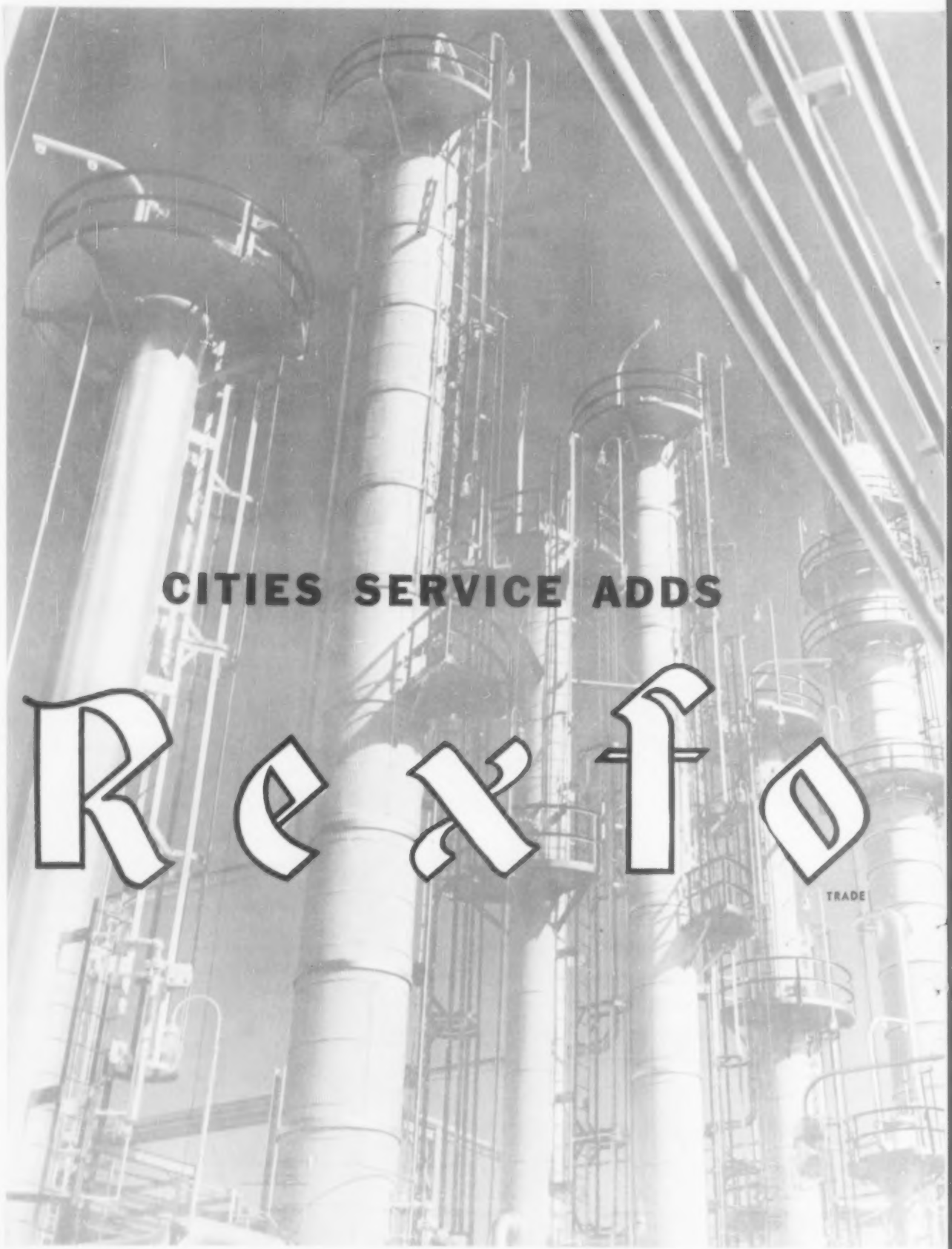
6 EAST 45TH STREET, NEW YORK 17, NEW YORK • 6218 CEDAR SPRINGS ROAD, DALLAS 9, TEXAS • 3817 SOUTH SANTA FE AVENUE, LOS ANGELES 58, CALIFORNIA • 910 SOUTH BOSTON STREET, ROOM 1008, TULSA, OKLAHOMA • 1252 OAKLEIGH DRIVE, EAST POINT (ATLANTA) GEORGIA


CITIES SERVICE ADDS
Rexfo
TRADE

After an exhaustive study, Cities Service Oil Company (Del.) has chosen the UOP Rexforming process as the best method for upgrading low octane naphthas to meet the rapidly increasing demand for higher octane gasolines.

A 6,000 barrel per stream day Rexformer will be installed at Cities Service Ponca City, Okla., refinery as an important part of an extensive new construction and expansion program.

By installing the Rexforming process, the latest development in the catalytic reforming field, Cities Service will be assured of obtaining the best yields of the highest octane blending material for the company's motor fuels. Rexforming, developed by Universal, is capable of producing gasolines having octane ratings considerably in excess of 100 clear.

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Forty Years Of Leadership
In Petroleum Refining Technology

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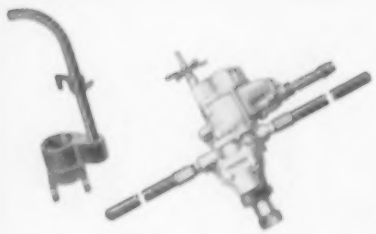
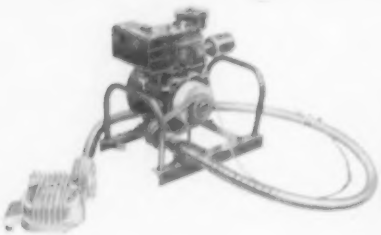
C1-36 DRILLING MACHINE...
WITH POWER DRIVE

saves time on pressure tie-ins

Make tie-ins into the system, even while under pressure, by drilling through tapping sleeves and valves, flanged tees or Save-a-Valve Drilling Nipples quickly, easily and safely with the power driven C1-36 Drilling Machine. Makes cuts from 2" through 12½" with boring bar travel of 36" controlled by automatic feed. Operating pressures range from 250 p.s.i. at 500° Fahrenheit to 500 p.s.i. at 100° Fahrenheit.





optional power drives

H-600 Air Motor Drive operates under full load with 90 cubic feet of air at 90# pressure, developing maximum torque of 250 foot pounds. Motor turns at 56 rpm under full load and will advance the boring bar 1" in 7½ minutes.

H-602 Gasoline Engine Drive equipped with centrifugal clutch that automatically picks up load as engine speed passes 1000 rpm. Governed engine speed of 2700 rpm drives Drilling Machine at 54 rpm, advancing boring bar at same rate as air motor.

Write direct for complete information and prices on the C1-36 Drilling Machine with power drive. We can show you how this machine and other related products can make fast tie-ins for you.

MUELLER CO.

Dependable Since 1857

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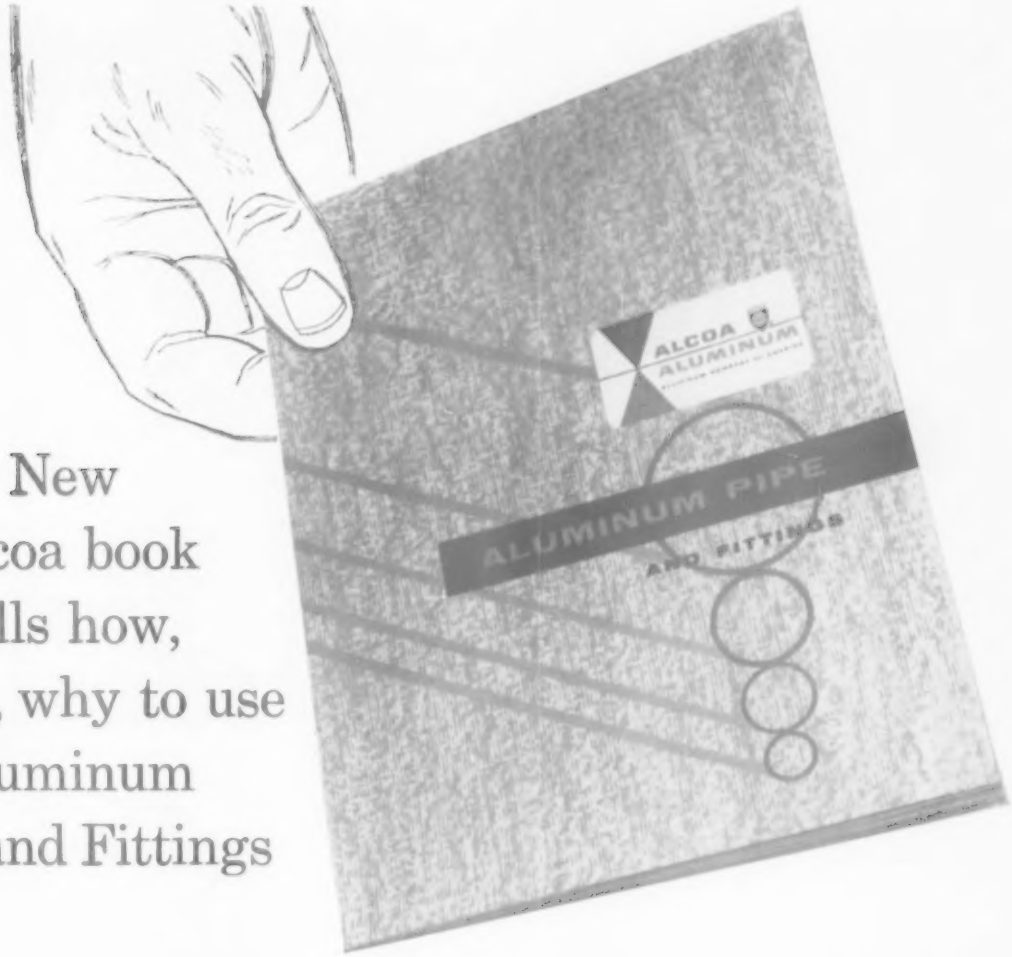

New Alcoa book tells how, where, why to use Aluminum Pipe and Fittings

ALCOA Aluminum Pipe is being used in more applications—solving more and more problems than ever before. That's because ALCOA Aluminum Pipe offers three important advantages: (1) Its low price makes it the least expensive material to use for special-purpose piping; (2) Its lightness makes it ideally suited for quick, economical installation; (3) Its durability keeps maintenance and replacement costs at rock bottom.

The complete story is in this new ALCOA book. Filled with useful illustrations and charts, it gives all the facts on the latest uses of ALCOA Aluminum Pipe and Fittings for:

PROCESS PIPING APPLICATIONS for carrying fluids in chemical and petroleum plants, food processing plants, and many others.

PIPELINE APPLICATIONS for carrying oil and gas; for mine drainage and similar applications.

PORTABLE PIPING APPLICATIONS for supply or disposal lines that handle water, steam, compressed air, fuel and other commodities in such operations as construction, oil well drilling and mining.

STRUCTURAL PIPING APPLICATIONS for use as railings, fence posts, playground equipment, storage racks and scaffolds, and other outdoor uses.

All this plus detailed information on fittings and flanges, valves, installation procedures, and eight helpful tables to aid you in selecting the *right* ALCOA Aluminum Pipe for your need.

Write today for your free copy. Use the coupon.

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ALUMINUM COMPANY OF AMERICA

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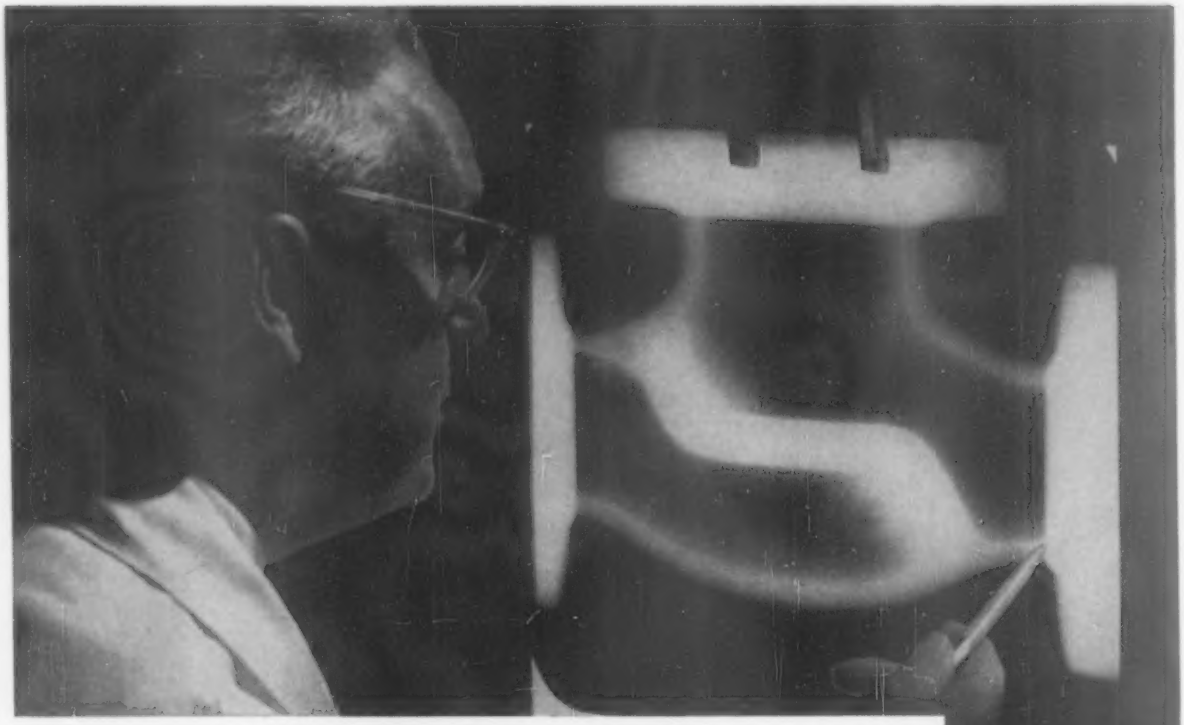


Inside story:

Valves may look alike on the surface. Their performance is another story. And the inside story of Powell Valves is that *every* Powell Valve has *Performance Verified.*

X-ray and gamma ray inspection—examining the very structure of the metal itself—are two of the many ways that Powell can make absolutely certain that Powell Valves will give *dependable* flow control.

Every part of every valve must pass rigid inspection. As a final step in manufacture, every Powell Valve is subjected to *an actual line test.* Because of Powell's pains-taking quality control, valve repair is cut to the minimum and plant shut down through valve failure is substantially reduced. Records from refineries, power and industrial plants the world over prove it.

Consult your Powell Valve distributor. If none is near you, we'll be pleased to tell you about our COMPLETE *quality line* which has PERFORMANCE VERIFIED.

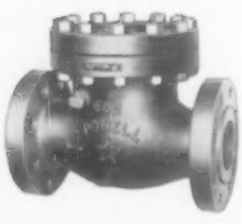
The Wm. Powell Company, Cincinnati 22, Ohio . . . 110th YEAR

PERFORMANCE PV VERIFIED

FIG. 1503—150-Pound Steel Gate Valve.

FIG. 6003—Steel Gate Valve for 600 Pounds W.S.P.

FIG. 6061—600-Pound Steel Swing Check Valve.



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Assembly-line construction of offshore units in the modern Schlumberger shop — Houston.

To meet the demands of offshore drilling, Schlumberger is devoting its extensive shop facilities to the construction of completely equipped offshore units. Pride of workmanship and the experience gained in building hundreds of Schlumberger field units go into this compact offshore equipment. It is rugged and reliable. And you can be sure that offshore you will receive the same high quality service and experience that Schlumberger has provided in more than 900,000 operations.

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NEW **REPUBLIC V5 GAUGES**

Individual, Independent Measuring Units for
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High Accuracy Receivers for Pnuematic Transmitters and Electric Meters Measuring
FLOW • PRESSURE • CO_2 • DENSITY • LIQUID LEVEL • OTHER PROCESS VARIABLES

Important Features

- FIVE INCH ILLUMINATED SCALES
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- MULTIPLE OR INDIVIDUAL MOUNTING — from one to eight units to a single case
- EASILY MOUNTED—no panel drilling necessary in most cases
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- REMOVAL FROM FRONT OR BACK

Now you don't have to sacrifice instrument performance and readability to size considerations. With Republic's new line of small-size V5 Gauges, you can save panel space, make more compact instrument groupings and *still* get the accuracy, sensitivity and readability you would expect from conventional sized instruments. Full sized diaphragms, bellows and helix units in V5 Gauges assure "big" gauge performance in an instrument that requires only one-fourth the panel space of conventional gauges. Five inch scales are almost flat and are indirectly illuminated as a standard feature for easy reading — even from a distance.

● ***Write for New V5 Bulletin*** ▶

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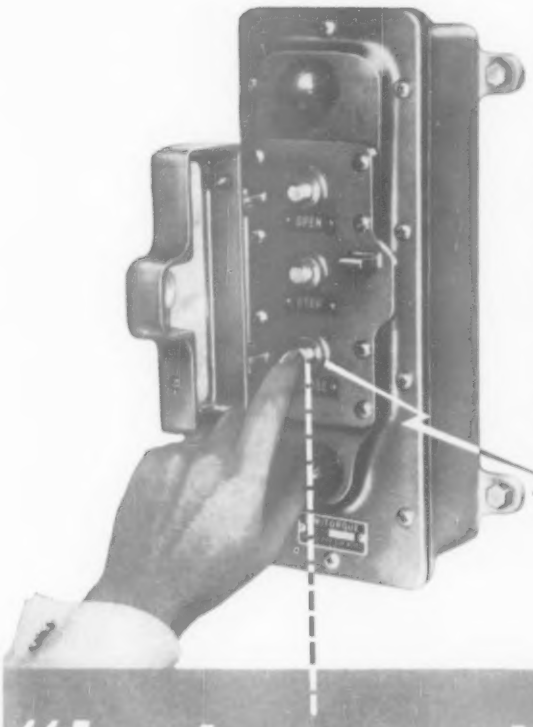

truly *Automatic* VALVE OPERATION

with **Limitorque®**

"just press the button"

Think of the time, labor and money that can be saved by opening and closing valves in remote, inaccessible or distant locations with LimiTorque . . . automatically, from a centrally located control panel. LimiTorque not only operates valves at the speed required, but it "limits the torque" applied to the valve operating parts and thus prevents damage to stems, seats, discs or gates . . . and too, the handwheel "cannot rotate" when the valve is being motor-operated. LimiTorque may be actuated by any available power source; such as electricity, gas, steam, water, oil or air—and is readily adapted for Microwave Control. Thousands of these units are being used in Power Plants, Oil Refineries and Pipe Lines, Water and Sewage Plants, Chemical Plants, Pulp and Paper Mills, and on Shipboard.

The above is a Type SMA-000 LimiTorque for operating smaller valves. There's a type and size of LimiTorque for every valve operating need.

Send for Catalog L-550, and be convinced

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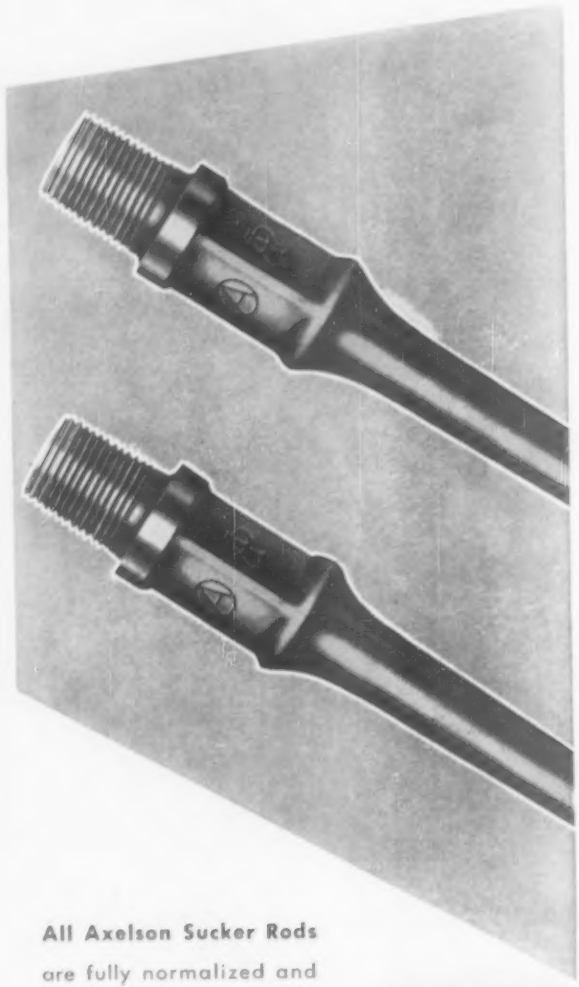
Cut Lifting Costs with Axelson Trouble-Free Rods



HEAVY LOADS and irregularities in pumping? Ask your J&L man for Axelson No. 59 Sucker Rods, made of nickel-molybdenum alloy steel to resist corrosion fatigue.

AVERAGE TO HEAVY conditions? Ask your J&L man for Axelson No. 60 Sucker Rods, made of high grade carbon-manganese steel.

EXTREMELY HEAVY LOADS where corrosion is not a serious factor? Ask your J&L man for Axelson No. 77 Sucker Rods, designed for long-stroke pumping with low impulse factors. Made of nickel-molybdenum alloy steel.

SEVERE SERVICE (high loads, corrosive conditions, high impact and other stresses)? Ask your J&L man for Axelson No. 79 Sucker Rods, made of nickel-molybdenum-vanadium alloy steel.

HIGHLY VISCOUS CRUDES, PARAFFIN or CORROSIVE CONDITIONS? Ask your J&L man for Axelson Hol-O-Rod Sucker Rods for injection of controlling fluids. The FIRST hollow rods with ends integrally forged with the body.

All Axelson Sucker Rods are fully normalized and tempered from end to end after forging but **before** threading. You get maximum strength and ductility. Every rod is as straight as a rifle barrel. Rod ends are designed to eliminate excess stress concentration.

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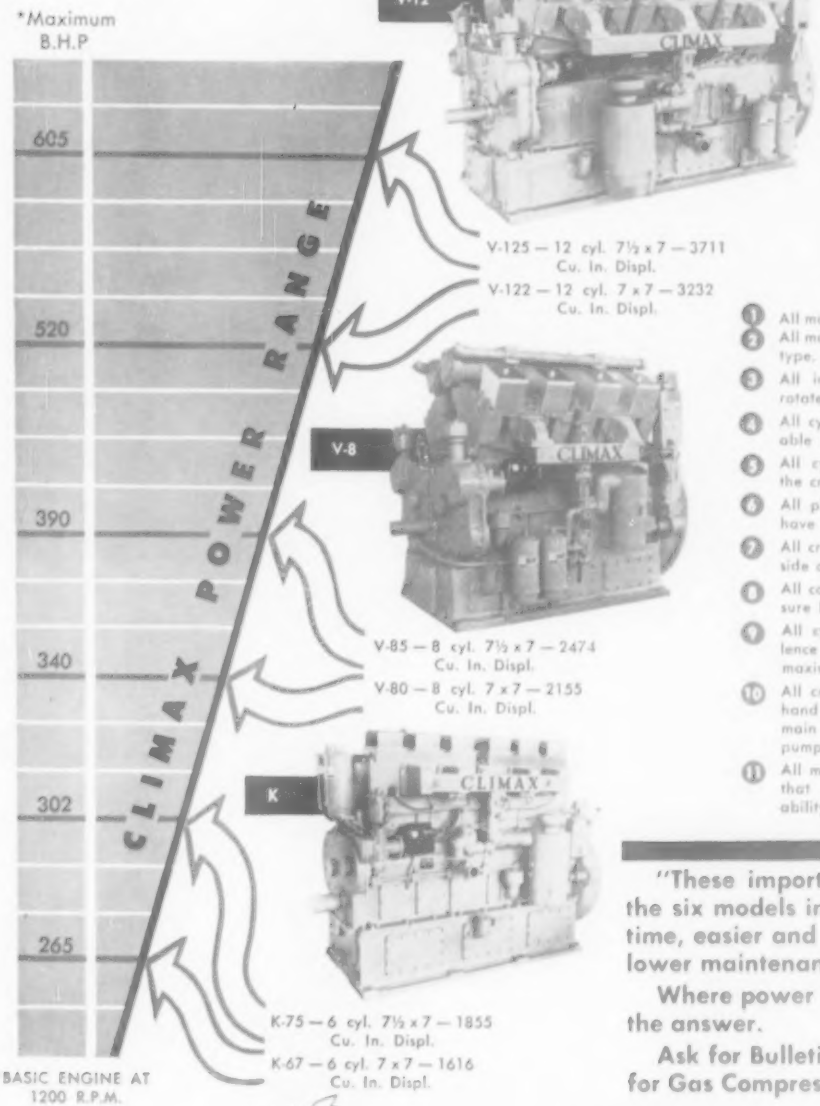
134-G

climax Blue Streak Engines


*Maximum B.H.P
605
520
390
340
302
265
CLIMAX POWER RANGE
*BASIC ENGINE AT 1200 R.P.M.
V-12
V-125 — 12 cyl. 7½ x 7 — 3711 Cu. In. Displ.
V-122 — 12 cyl. 7 x 7 — 3232 Cu. In. Displ.
V-8
V-85 — 8 cyl. 7½ x 7 — 2474 Cu. In. Displ.
V-80 — 8 cyl. 7 x 7 — 2155 Cu. In. Displ.
K
K-75 — 6 cyl. 7½ x 7 — 1855 Cu. In. Displ.
K-67 — 6 cyl. 7 x 7 — 1616 Cu. In. Displ.

OFFER THE BIGGEST VALUE IN THE ENGINE INDUSTRY

1. All models have 7" stroke.
2. All main and rod bearings are the precision type.
3. All intake and exhaust valves are free-to-rotate type.
4. All cylinder blocks are provided with renewable sleeves.
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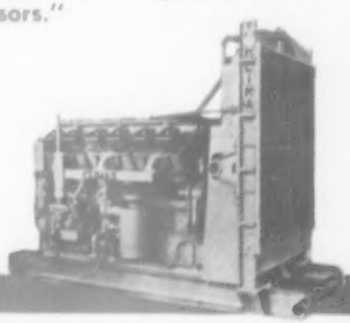
6. All pistons are aluminum, cam ground, and have five rings.
7. All crankshafts have a main bearing on each side of each crankthrow.
8. All connecting rods are rifle drilled for pressure lubrication of piston pins.
9. All cylinder heads have Climax high turbulence type combustion chambers which produce maximum fuel economy.
10. All crankcases and engine bases have large hand holes on each side for easy access to main and connecting rod bearings and oil pump.
11. All models have the Climax consistent design that makes possible maximum interchangeability of wearing parts.

"These important features applying to the six models indicated, mean less down time, easier and faster field servicing and lower maintenance costs.

Where power is your problem Climax is the answer.

Ask for Bulletin SA-611 — "Special Units for Gas Compressors."



climax BLUE STREAK ENGINES

CLIMAX ENGINE AND PUMP MFG. CO.

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From one source . . . any instrumentation you need

When it comes to measurement and control, every industrial process is different. Each demands its own combination of accuracy, economy, instrument ranges, and all the numerous other characteristics that are peculiar to the individual application.

No single instrument and its accessories could possibly fit every process. So Honeywell makes a broad variety of measuring and controlling equipment that spreads across a tremendous range of applications.

The advantages are two-fold. First, you can get all the instrumentation your process requires from a single source, so there is undivided responsibility for the complete installation. And second, you are assured that the equipment selected for your process is recommended without bias . . . neither over-sells nor under-equips . . . needs no stretching, squeezing or compromising to fit it to its assignment.

This versatile family includes *ElectroniK* indicators, recorders and controllers in circular and strip chart models, applicable to temperature, pressure, pH, power and dozens of other variables; square root flow meters for control applications; evenly graduated flow meters for cost accounting; thermometers, pressure gauges and liquid level meters; *Pyr-O-Vane* millivoltmeter controllers. Especially useful for graphic panels are the *Tel-O-Set* miniature indicators, recorders and controllers. Electric and pneumatic control systems range from the simplest to the most complex, including automatic program controls and complete systems developed for particular processes.

Working with these instruments is a full choice of primary elements . . . thermocouples, *Radiamatic* radiation elements, pressure-type and electrical resistance thermal systems, flow meter bodies, pH cells and many others. For final control elements, you can choose from a wide range of electric motorized and diaphragm operated valves. To complete the picture, there are more than 7000 non-indicating devices for controlling temperature, pressure, vacuum, liquid level and humidity . . . an unmatched variety of instrumentation made by the world's largest manufacturer of control equipment.

Honeywell cascade control maintains accurate reheater

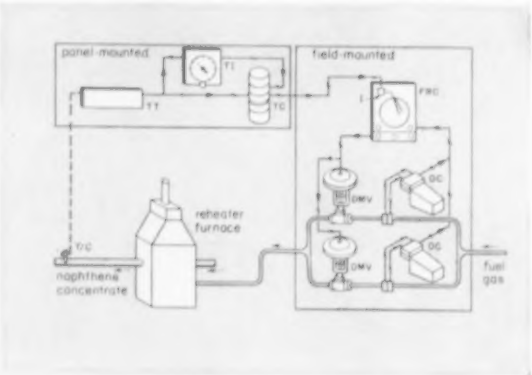
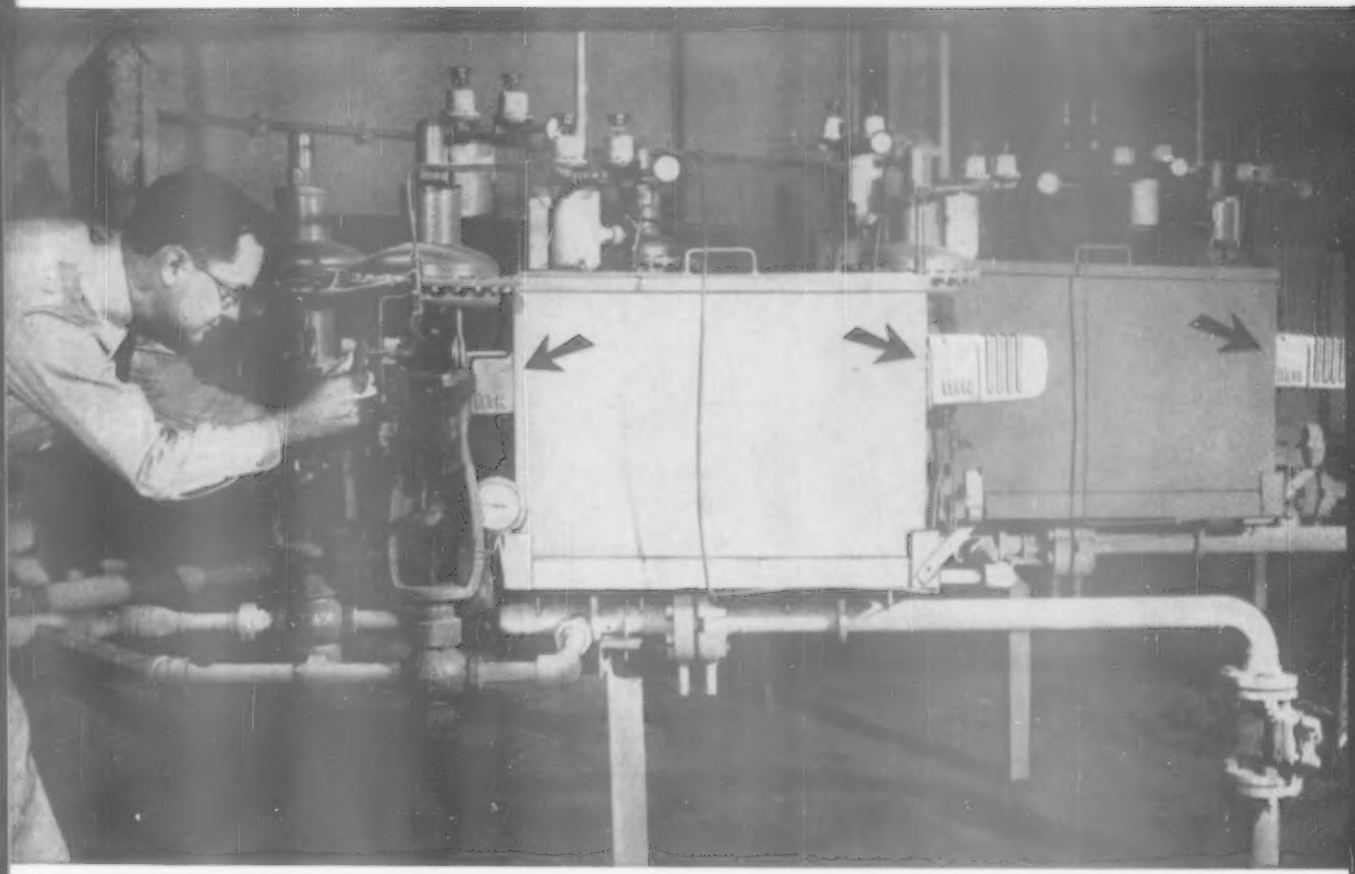


Diagram shows basic elements of temperature control system. Grouping ***Tel-O-Set*** *indicator, controller and temperature transmitter together minimizes control tubing runs . . . simplifies tuning of control action.*



Flow of fuel gas to reheater furnaces is transmitted to nearby controller by ***Differential Converters*** *(see arrows). Cascade control system actuates diaphragm valves in each line.*

temperatures in Sun Oil Plant

SUN OIL COMPANY'S $15 million petrochemicals plant at Marcus Hook, Pa., makes use of the most advanced control techniques to assure efficient production. Designed to produce toluene, benzene, xylenes and numerous valuable by-products . . . the plant features Honeywell graphic centralized control, plus supplementary field-mounted instrumentation in specific spots where local data is needed.

The Honeywell cascade system used to regulate reheater furnace temperature typifies the intricate control instrumentation required for many processes. The furnace feeds the *Houdriformer* unit, and must supply widely varying Btu output depending on the end product. The furnace has considerable control lag, and fuel gas may vary in composition and pressure. To overcome these factors, a *Tel-O-Set* instrument on the main panel measures temperature of heated stock and resets the control index of a Brown Flow Controller. The flow instrument is located near the furnace where fireman can check readings. This controller, in turn, regulates diaphragm valves in the two fuel gas lines supplying the furnace. Adjustable limit stops in the flow controller's *Indexet* unit prevent closing of the gas valves beyond safe limits during sudden surges in temperature. The result is exceptionally consistent, close-limit control.

Numerous other specialized control applications can be readily handled by Honeywell custom-designed cascade and ratio systems. A broad variety of instrumentation, and an extensive background of experience in petroleum processing control are ready to serve you. Your local Honeywell sales engineer will welcome the opportunity to discuss your specific application . . . and he's as near as your phone.

MINNEAPOLIS-HONEYWELL REGULATOR CO., *Industrial Division*, Wayne and Windrim Avenues, Philadelphia 44, Pa.

● **REFERENCE DATA:**
Write for Catalog No. 2320
and Bulletin No. 8410

MINNEAPOLIS
Honeywell
BROWN INSTRUMENTS

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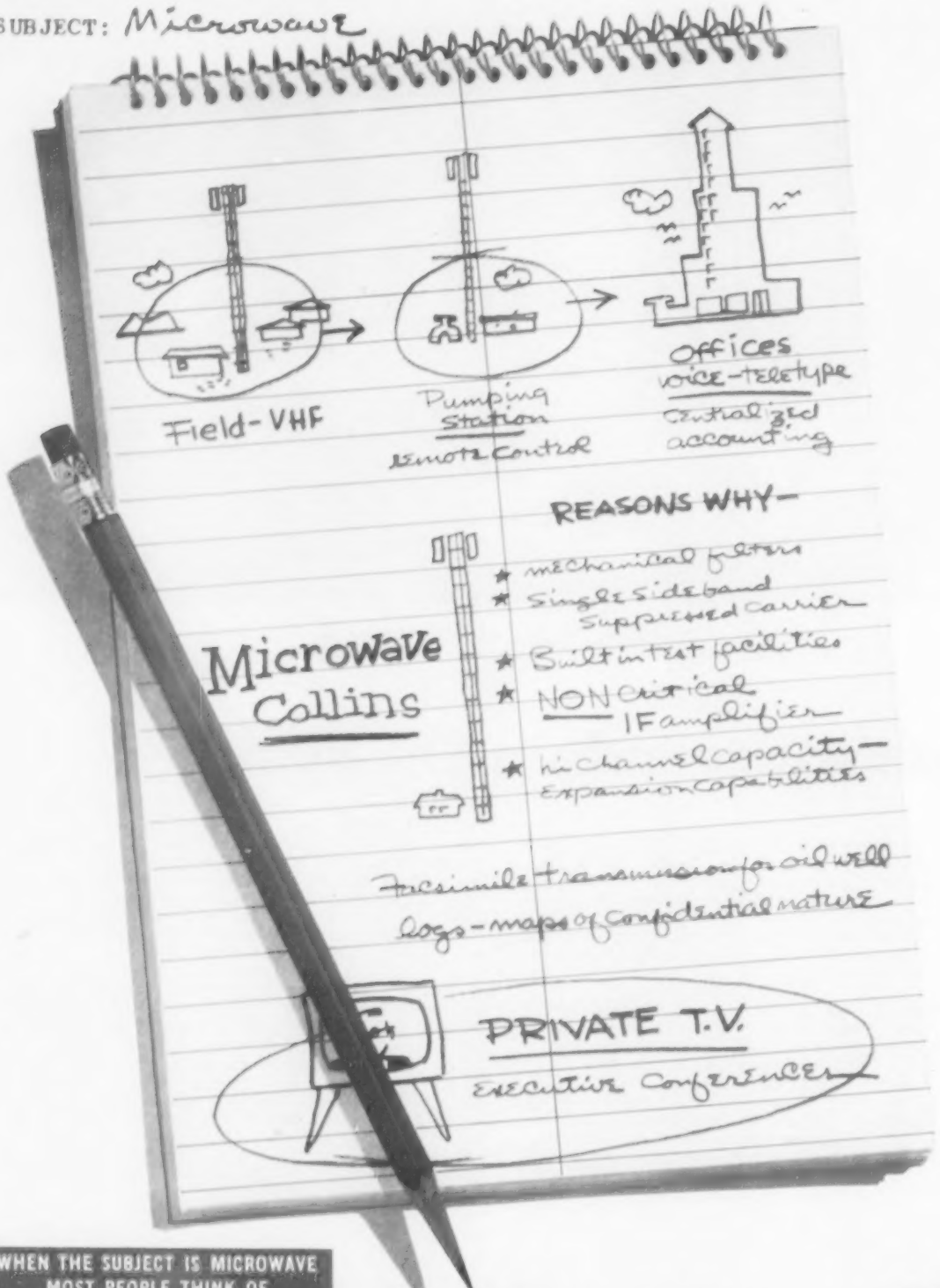
First in Controls



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Better to start with – best in the long run. That's the power-packed story of American Bosch Magnetos . . . today's finest ignition units. Many advanced features give them greater power for split-second starting and premium engine performance PLUS built-in stamina that assures years of constant, trouble-free service in your Drilling, Producing, Pipe-Line and Refinery equipment. That's why they're so widely used as original equipment by many leading engine builders.

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Johns-Manville TRANSHIELD® ASBESTOS PIPE LINE FELT

goes on fast, restricts soil stress, cuts maintenance

Transhield Asbestos Pipe Line Felt meets the need for a felt that is economical yet effective in all ordinary soil conditions.

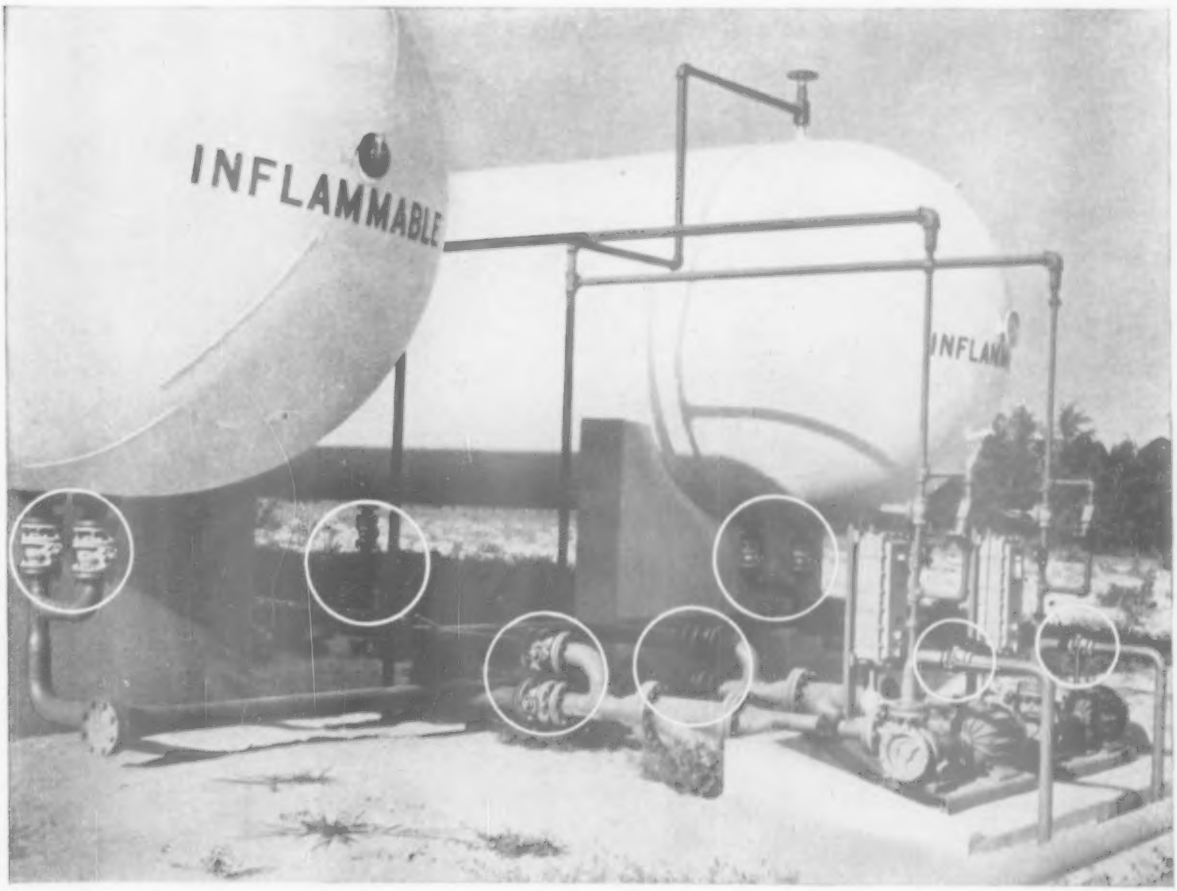
Designed for easy, high-speed application by modern machine methods, Transhield is strong, light in weight, and highly tear-resistant. Longer length rolls increase application speeds since fewer stops to replace rolls are required. Transhield's highly desirable characteristics are attained through an innovation in felt construction. It consists of a lightweight coal-tar saturated asbestos felt, reinforced with continuous glass yarns parallel-spaced on ¼" centers.

Because Transhield is a continuous membrane between the pipe line enamel and the soil, it works effectively toward preserving a continuous protective film of enamel on the pipe. It guards the enamel during construction and, after installation, it reduces the cold flow of the enamel, acting as a surface barrier to restrict soil stress.

• • •

For further information about Transhield, write to Johns-Manville, Box 60, New York 16, New York; in Canada, 565 Lakeshore Road East, Port Credit, Ontario.

Johns-Manville PRODUCTS FOR PIPE LINE PROTECTION



The valve that "plays ball" with LP men

The valves are important wherever there are oil lines.

Here at Hiwan Oil Company, Houston, Texas, there are Rockwood Ball Valves at a dozen points in the lines. Here there's perfect safety, because the Rockwood seal is leakproof . . . speed of transfer, because of Rockwood's full round flow . . . quick operation because a quarter turn does the trick.

Yes, here are the four exclusive features that explain and guarantee the performance of Rockwood Ball Valves —

Full Round Flow — no change in shape or volume of fluid stream — no turbulence — no minimum loss.

Quick Opening and Closing — only a quarter turn needed.

Longer Wear-Resistance — Chrome-plated bronze ball withstands abrasion, pitting and scratching.

Leakproof Seal — pressure of fluid automatically positions ball against seat to form tight seal.

If you are not now using Rockwood Ball Valves, send coupon today for complete information. Valves come in all pipe sizes. Tested and listed by Underwriters' Laboratories, Inc. Distributors in principal industrial areas.

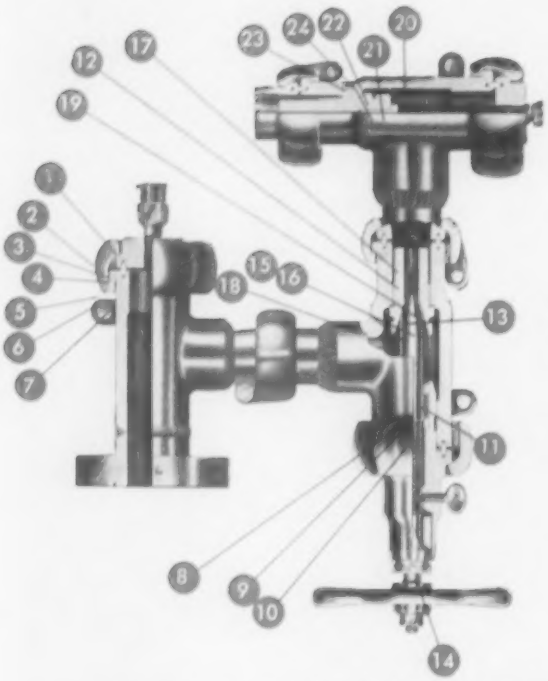
ROCKWOOD BALL VALVES

ROCKWOOD

ROCKWOOD SPRINKLER COMPANY
768 Harlow Street
Worcester 5, Mass.

Send me illustrated folder V-4 on Rockwood Full-Flow Ball Valves.

Name .....
Title .....
Company .....
City .....
Zone ..... *State* .....



Are you getting all of these important features for your flow manifold dollars?

These are the "Extras" that make UNIBOLT the best buy of all manifolds

1	Tee cannot be accidentally opened.	13	Wing Valve requires no grease to effect a seal . . . may also be used as micrometer-gauged flow bean.
2	No exposed threads . . . no accidental damage.	14	Variable choke speeds up initial clean-up or running initial flow tests . . . saves rig time.
3	Concealed seat in groove . . . no accidental damage.	15	Nitrided hardened stem and stem seat . . . resists corrosion.
4	All metal seat . . . not affected by high or low temperature.	16	Choice of hard chrome plated or "SA" stainless stems and seats.
5	Lubricators, bottom hole pressure adapters, and valves easily attached to Unibolt connection.	17	Unrestricted 1" opening in Wing Valve will pass 10,000 bbls. of fluid per day with 100 lbs. pressure drop.
6	2"—3000 lb. wp Unibolt 28% stronger than 2"—ser. 900 flange.	18	Wing Valve can be completely overhauled without removal from tree.
7	Unibolt stronger than tubing threads . . . ideal for working trees with welded lift nipple. Tubing threads in tee if desired.	19	Wing Valve stem seat sealed by power threads and metal gasket assures alignment.
8	Stem packing needs no tightening.	20	Positive Choke Body takes regular or "X" Beans . . . all beans flow-rated.
9	Stem turns freely under high pressures.	21	Shaped entrance on beans prevents paraffin clogging.
10	Threads on stem not exposed to external or internal damage.	22	Positive Choke Body may be replaced with inexpensive tee and cage nipple.
11	Full 2½" pilot for true stem alignment and rigidity.	23	Positive Choke Body can be converted to Adjustable Wing Valve by substituting two parts.
12	Streamlined flow — no obstructions . . . no turbulence.	24	Beans and stem seats have external hex for wrenching.

UNIBOLT

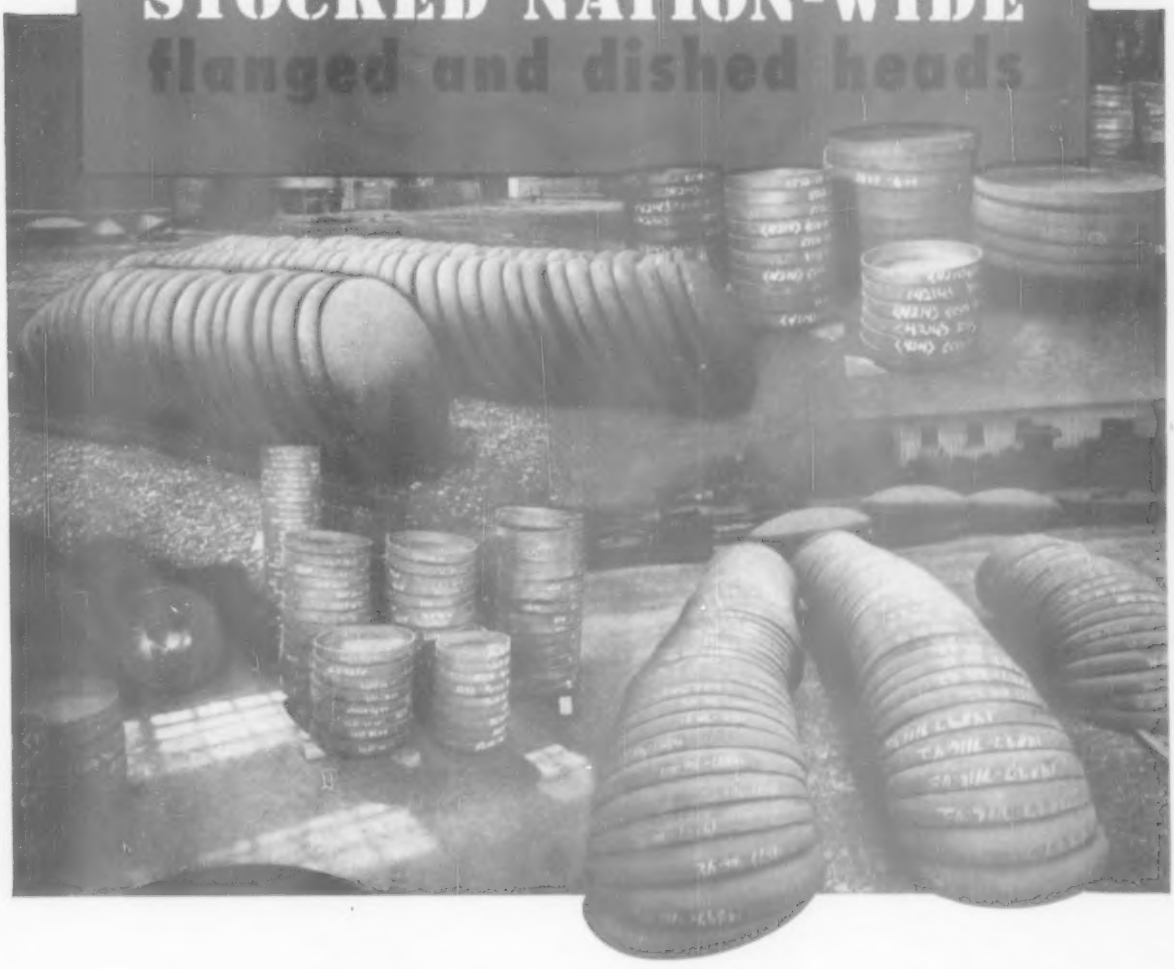
FLOW MANIFOLD

Eliminates impingement of flow and negative pressure areas. It may be salvaged completely or as separate units. The three separate units provide flexibility in arrangement of connections. All parts easily replaced in the field . . . all parts interchangeable. Check the accompanying list of other distinctive features. UNIBOLT offers far more safety, flexibility, efficiency, and all-round quality for your flow manifold dollars.

THORNHILL CRAVER CO.

P. O. BOX 1184
HOUSTON, TEXAS

STOCKED NATION-WIDE
flanged and dished heads



Stocked at CF&I warehouses throughout the country, Claymont Flanged and Dished Heads are always conveniently and promptly available —in standard and ASME types.

Claymont Flanged and Dished Heads are stocked in sizes from 18 inches to 8 feet in overall diameter, and in gauges from 3/16 inch to 3/4 inch. Supplied from carbon steel.

We are also prepared to handle head-forming operations on both ferrous and non-ferrous metal supplied by the customer. To order, contact our nearest sales office or write direct to Wickwire Spencer Steel Division, The Colorado Fuel and Iron Corporation, P. O. Box 1951, Wilmington, Delaware.

Claymont Steel Products

Products of Wickwire Spencer Steel Division • The Colorado Fuel and Iron Corporation

CF&I

2763

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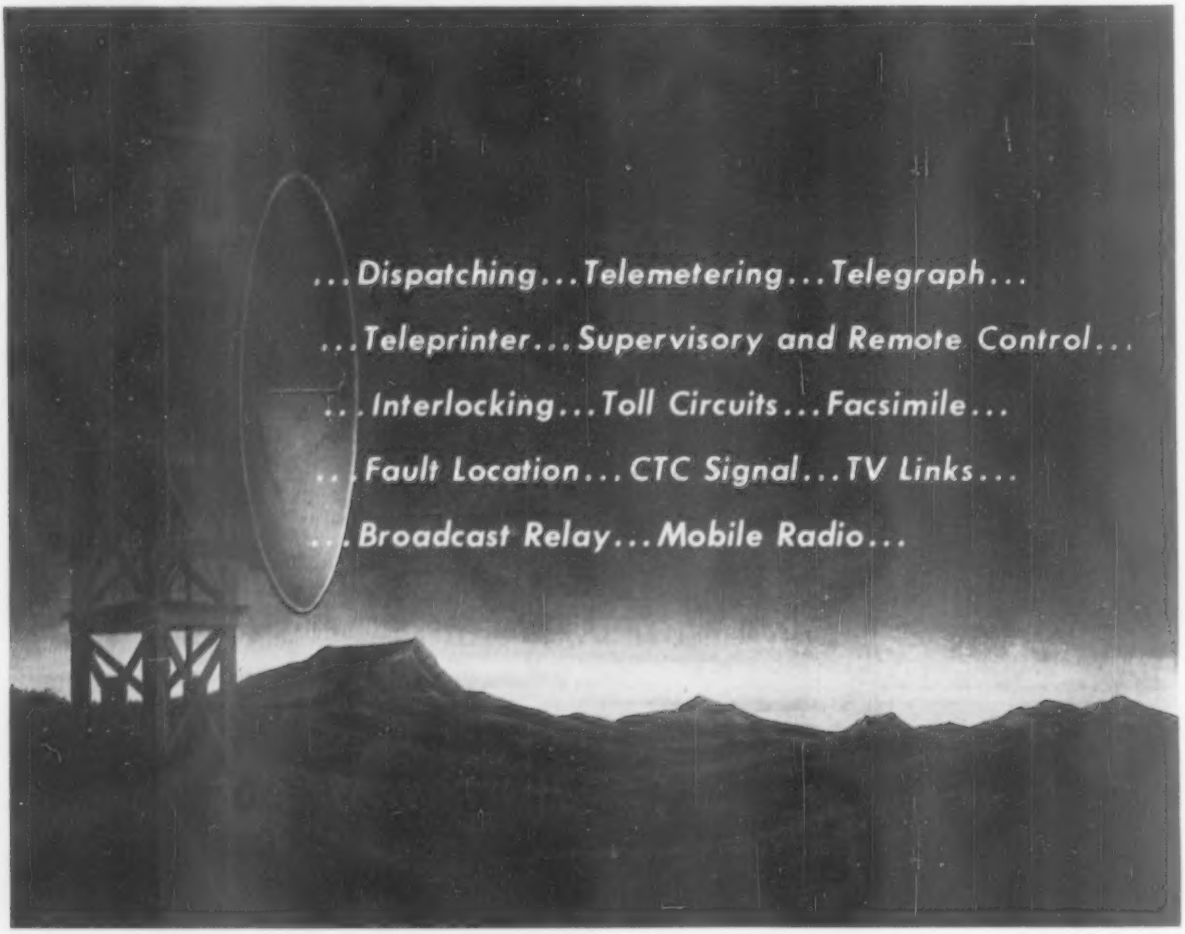

Peak performance for your communication needs

Whatever the voice, message, and signal circuits your industry needs for the transmission of its operating intelligence, a *Federal* multichannel microwave system can provide them ... completely ... continuously ... simultaneously ... and with topmost dependability.

Federal Microwave has a built-in record of quality and performance that is unique in the field ... a record of progress that reaches back to the birth of the art ... to the world's *first* commercial microwave link ... inaugurated decades ago by companies of International Telephone and Telegraph Corporation.

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It is this background ... this *pioneering* spirit ... that keeps *Federal* Microwave outstanding for its *peak* performance ... distinguishes it as the microwave system that's *"Certified by a World of Research!"*

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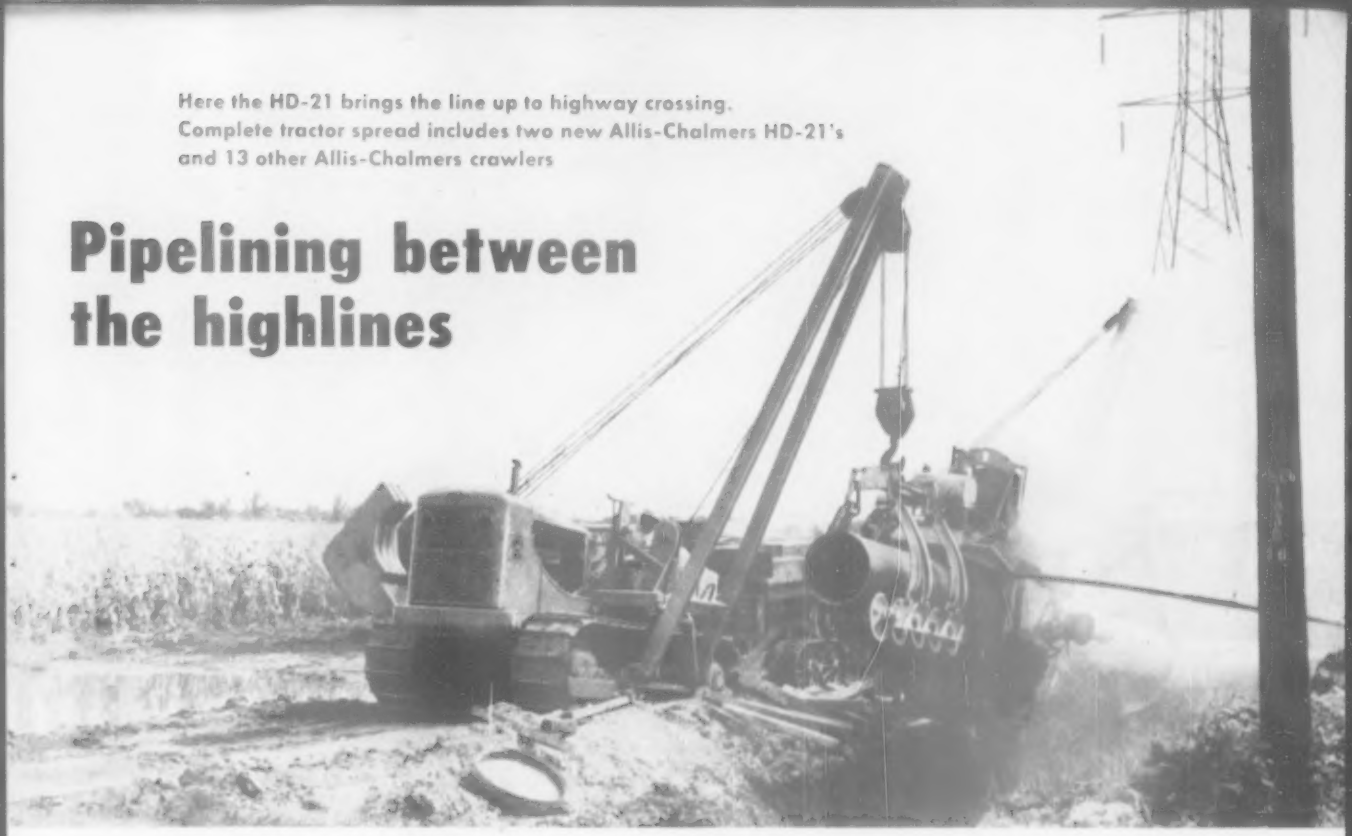
In Canada: Standard Telephones and Cables Mfg. Co. (Canada) Ltd., Montreal, P.Q.
Export Distributors: International Standard Electric Corp., 67 Broad St., New York

Here the HD-21 brings the line up to highway crossing.
Complete tractor spread includes two new Allis-Chalmers HD-21's
and 13 other Allis-Chalmers crawlers

Pipelining between the highlines



Allis-Chalmers Tractors lay 30-in. line on high tension right-of-way for Contracting and Material Company

Putting down a 30-in. gas line in trench only a few feet from high tension line towers is tough and tricky — but Contracting and Material Company, Evanston, Illinois, made it look easy with their Allis-Chalmers torque converter crawler tractors. The job, located in the outskirts of Joliet, Illinois, called for precision maneuvering, and the 39-ton Allis-Chalmers tractor-boom combinations moved around those steel towers with the ease and agility of a lightweight.

Torque converter tractors work as coordinated unit

In putting in this line, which was lowered directly from dope-wrap into the trench, three Allis-Chalmers torque converter crawler tractors, headed by the new HD-21, handled the job. The work involved frequent catch-off and catch-on by the tractors due to the closely spaced highline towers blocking the way. In spite of these obstacles, the three crawlers worked as a smoothly coordinated unit. With proved torque converter drive, they matched speed perfectly with the dope-wrap machine. The self-energizing brakes and easy-handling controls really paid off in the close-quarter maneuvering.

ALLIS-CHALMERS HD-21

204 net engine hp
127,000-lb lifting capacity at 4-ft overhang
78,250-lb tractor and side boom with full counterweight

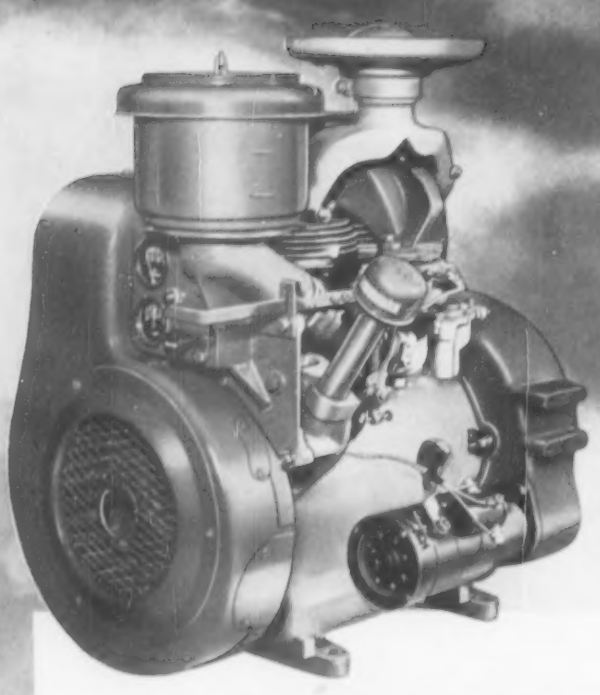
Whether in close-quarter work or clear sailing on open right-of-way, you can cut costs and speed up operations with an Allis-Chalmers spread. Get full details on the completely new line of crawler tractors and matched equipment. Let your Allis-Chalmers dealer show you the all-new HD-21, HD-16, HD-11 and HD-6. See him now.

CONSTRUCTION MACHINERY DIVISION, MILWAUKEE 1, WISCONSIN

ALLIS-CHALMERS AC

Around the line she goes. Here the HD-21 catches-off the line and swings around the tower. Shifting is practically eliminated, operator can concentrate on his side-boom work and keep a lookout for the towers.

NOW... out of 250 million hours of flight power experience comes



a NEW air-cooled industrial engine the FULL POWER LYCOMING C2-90

Rated 30 H.P.! Delivers 30 H.P.!

Specifically designed to solve oil industry problems

The C2-90 is built to the same high standards that have made Lycoming a top name in aircraft engines for over a quarter century. The C2-90 does just what we say it will do—work at full power under the most rugged conditions. So why buy an engine you have to de-rate (up to 50% for continual duty service)?

Reserve Power—C2-90's full-power rating provides ready reserve for everything from oil drilling machinery to pipeline equipment.

Long Life—C2-90 is ruggedly designed for thousands of hours of dependable service.

Cooling Design—C2-90 provides newly improved cooling surfaces to avoid overheating from dust conditions; a cooling fan that operates through entire speed range.

All-Weather Performance—C2-90 advanced air-cooled design delivers rated output in high temperatures or sub-zero.

Imagine running your car for 80,000 continuous miles without service! In Williamsport, Pa., the C2-90 was test-run at full load, full throttle for over 1,000 continuous miles with no service except for gas and oil. This is equivalent to running your auto 80 miles an hour for 1,000 hours non-stop, or 80,000 continuous miles *without service!*

For full details on the new Lycoming C2-90 write:
Sales Engineering, Industrial Engines,
Lycoming, Williamsport, Pa.

LOOK TO Lycoming

AVCO MFG. CORP. **defense and industrial products**

combine the scientific skills, and production facilities of 3 Avco divisions of Avco Manufacturing Corp. . . . Lycoming; Avco Advanced Development; Crosley—to produce power plants, electronics, air-frame components, and precision parts.

EATON FEATURES reduce hauling costs, keep trucks on the job

PLANETARY GEAR DESIGN —
distributes pressure and wear over four planetary gears, resulting in lower unit stress, reduced maintenance, longer axle life.

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supplies positive lubrication to all moving axle parts, even at slowest vehicle speeds.

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provides quick, easy shifts. Drivers use available gear ratios—the right ratio for road and load conditions.

SELF-CONTAINED AIR BRAKE —
provides for greater braking efficiency; quicker action, quicker release; quick, easy reline. Available on Eaton air brake models.

EXTRA-RUGGED CONSTRUCTION —
eliminates the possibility of harmful distortion or misalignment under full load, holds maintenance to a minimum.

More than Two Million
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Ask your truck dealer
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EATON 2-SPEED AXLES

EATON

AXLE DIVISION

MANUFACTURING COMPANY
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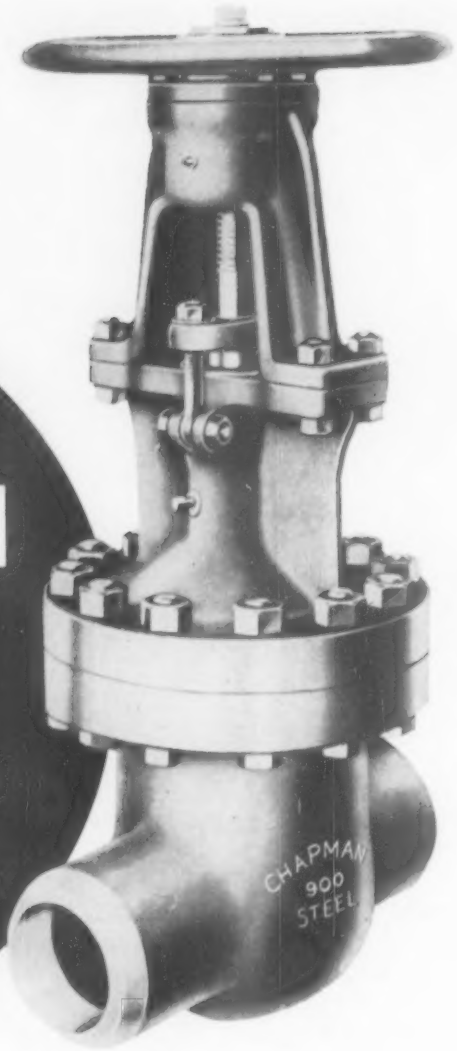
PRODUCTS: Sodium Cooled, Poppet, and Free Valves. Tappets. Hydraulic Valve Lifters Valve Seat Inserts. Jet Engine Parts. Rotor Pumps. Motor Truck Axles. Permanent Mold Gray Iron Castings. Heater Defroster Units. Snap Rings Springtites. Spring Washers. Cold Drawn Steel. Stampings. Leaf and Coil Springs. Dynamatic Drives, Brakes, Dynamometers

Specify CHAPMAN STEEL VALVES

in any of the Standard Alloys

to meet your steel valve needs



When you specify Chapman Steel Valves you also specify valve steels designed for your specific services. Standard alloys match every normal oil industry requirement. Special alloys can be furnished for extraordinary service conditions. All metals are poured in Chapman's own foundries under rigid laboratory supervision.

Exceptionally close machining tolerances are another standard feature of Chapman Steel Valves. Under the most severe conditions, Chapman Steel Valves seat tightly and positively, without jamming, chattering or wearing excessively. Operation remains smooth and dependable; maintenance costs stay low.

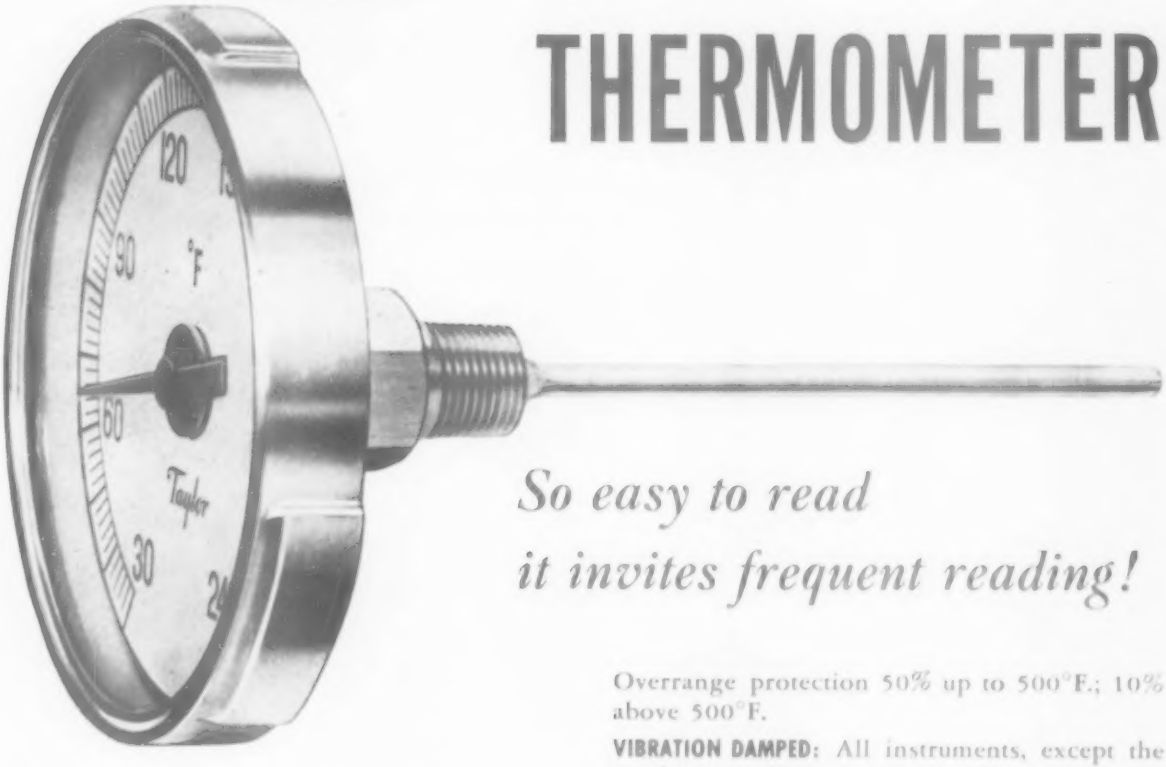
See Chapman *first* for gates, globes and checks in all pressure classes — 150, 300, 400, 600, 900 and 1500 pounds — and for temperatures from —150°F to 1200°F. Valves are available with bolted or welded body and bonnet joints and with flanged or welding ends. API standards are equalled or exceeded in every range. Write for Catalog No. 20.

THE CHAPMAN VALVE MANUFACTURING COMPANY

INDIAN ORCHARD, MASSACHUSETTS

Traditional Taylor accuracy in a low cost instrument

THE NEW BI-THERM* 5" DIAL THERMOMETER



So easy to read
it invites frequent reading!

A SIMPLE, dependable and economical thermometer with many applications throughout the petroleum field, such as, Heat Exchangers, Pipe Lines, Storage Tanks, Field Treaters. Wide variety of ranges from minus 40° to +750°F. Also available with three inch dial; stem lengths of 4, 6, 9, and 12 inches; separable wells of brass, steel, type 304 stainless steel or monel.

EASY TO READ: The large dials are highly readable because of black figures and graduations on an aluminum background.

RUGGED: All exposed metal parts are of arc welded, corrosion-resistant stainless steel. All instruments are waterproof. All mechanical connections are welded for greater reliability.

ACCURATE: These instruments are accurate within ±1% of range, over the entire range. Simple zero-setting features correct minor errors in readings which might result from severe mechanical shock. No ambient temperature effect. Overrange protection 50% up to 500°F.; 10% above 500°F.

VIBRATION DAMPED: All instruments, except the 200° to 750°F. range, are silicone damped against vibrations. Result is increased speed of response, no zero-shift due to shock, minimum pointer vibration, and elimination of pointer chatter when the thermometer is handled.

ECONOMICAL: Costs only **$16** to **$26,** depending on dial size and length of stem. Ask your Taylor Field Engineer, or write for **Bulletin 98267.** Taylor Instrument Companies, Rochester, N. Y., or Toronto, Canada.

*Trade Mark

Taylor Instruments
MEAN
ACCURACY FIRST

IN HOME AND INDUSTRY

LUFKIN

REQUIRES THE
Least IN MAINTENANCE
YET OFFERS THE
Most IN FIELD SERVICE

WHEREVER THERE IS OIL THERE ARE LUFKIN UNITS.

WHEREVER THERE ARE LUFKIN UNITS THERE IS A HIGHLY TRAINED AND COMPETENT LUFKIN FIELD SERVICE MAN AT YOUR COMMAND.

- The LOW operating and maintenance costs of LUFKIN pumping units is universally recognized, yet there is always a LUFKIN SERVICE MAN standing guard to keep your unit in tip-top condition.

- Whether yours is the first or the last of over 50,000 LUFKIN units in the field today, parts are readily available for any unit bearing the LUFKIN name plate.

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DROP FORGED STEEL

valves, fittings and flanges by Vogt

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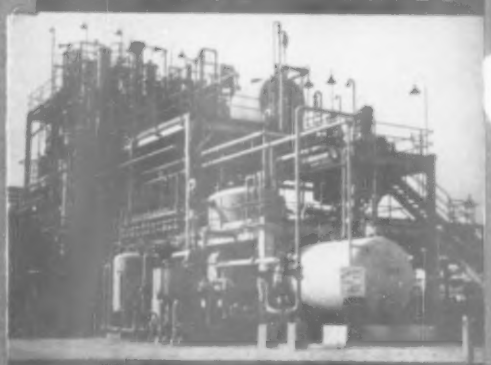

CHEMICAL PLANTS

POWER PLANTS

USED and TRUSTED by the NATIONS KEY INDUSTRIES

There are good reasons behind the trust which America's key industries have placed in Vogt valves, fittings, and flanges for half a century. They know that *drop forged materials* are uniform in structure, fine grained, and free from porosity. They know, too, and appreciate the meticulous care given these products through every stage of forging and machining in Vogt's modern shops, and about the many rigid tests and inspections. And that is why these products enjoy such an impressive record of performance in withstanding the shocks and stresses imposed by high or low pressures and temperatures and in resistance to erosive and corrosive conditions.

Service is another important factor in this confidence because Vogt maintains the world's largest and most complete stock of drop forged steel valves, fittings, and flanges always ready for immediate shipment.

Write for Catalog F-9. Consult its 400 pages for the complete Vogt line of drop forged steel valves, fittings, and flanges for oil, steam, water, air, gas, and refrigeration services.

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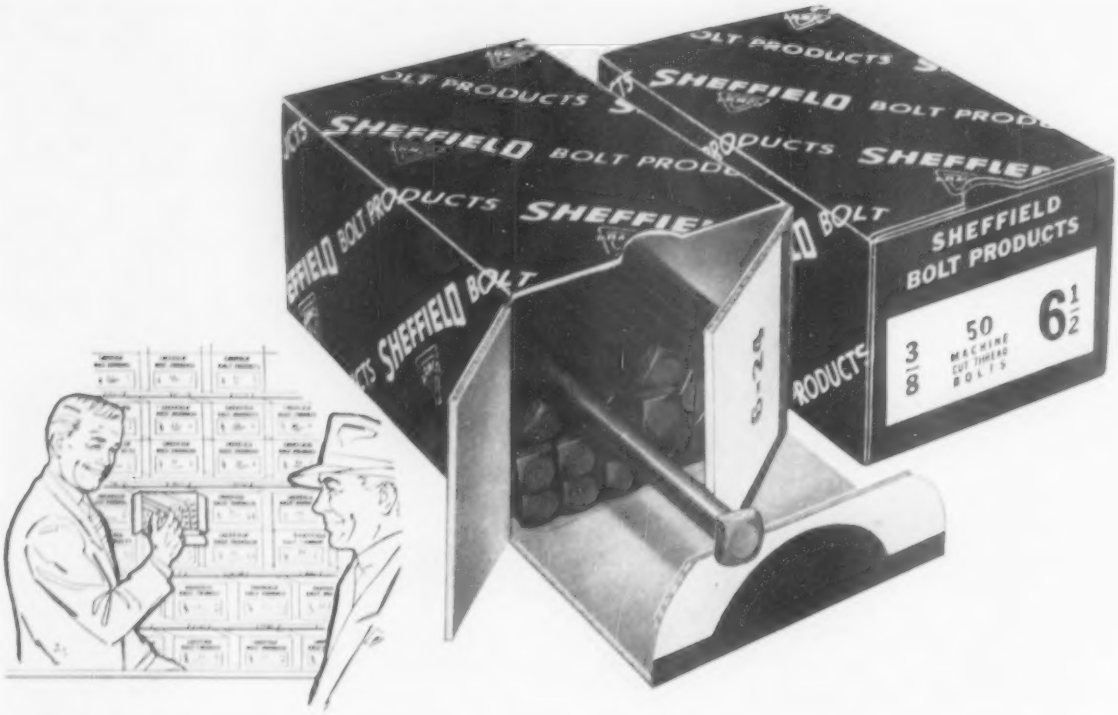
HENRY VOGT MACHINE CO., LOUISVILLE, KY.

SALES OFFICES: New York, Philadelphia, Chicago, Cleveland, Cincinnati, St. Louis, Dallas, Charleston, W. Va., San Francisco

HENRY VOGT MACHINE CO. ... 75th Anniversary ... LOUISVILLE, KY.



Sheffield Bolts For Every Oil Industry Need— Now Available In New "serv-a-bolt" Packages!

Riggers, tool pushers, tank builders and maintenance crews all swear by Sheffield bolts because of their clean, precision-formed, free-running threads and their close tolerance fit.

Sheffield bolts now come packed in convenient "serv-a-bolt" packages, too—makes for easier handling all around . . . in the supply room . . . on the truck . . . and on the job!

These trim and sturdy dispenser-end cartons "serve" bolts fast without fuss or fumble. Cartons open with finger-flick ease—you take out as many bolts as you need without disturbing the stack.

Look for this Sheffield package at your Oil Field Supply or Hardware store. Whether you want a single bolt, a carton or a case, you'll find them available in all sizes and for every oilfield requirement!

SHEFFIELD
ARMCO
Bolt Products

Be sure you keep a good variety of Sheffield bolts on hand for emergency requirements. Why not check your inventory now — then order what you need from your supplier?

SHEFFIELD STEEL
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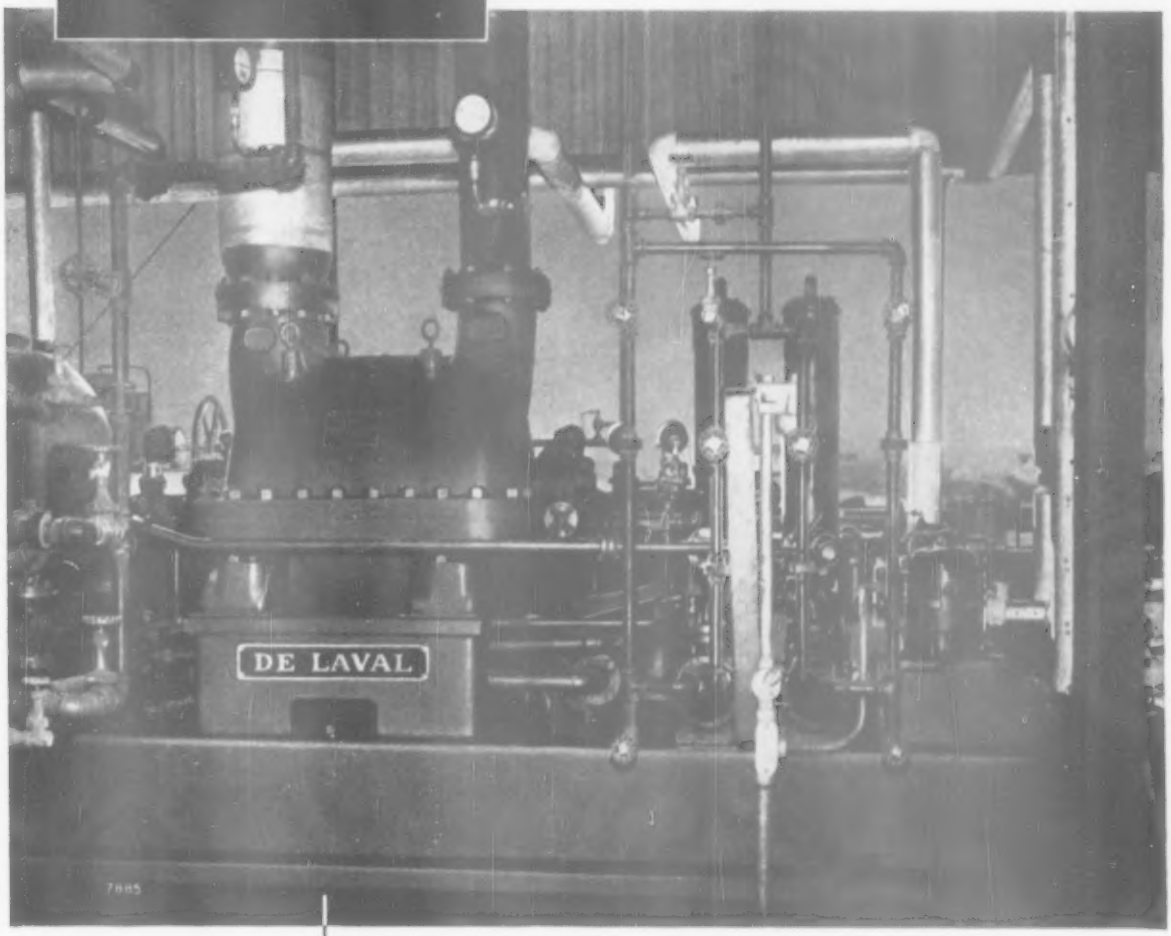
ARMCO STEEL CORPORATION
SHEFFIELD PLANTS: HOUSTON • KANSAS CITY • TULSA

MAKERS OF QUALITY
BOLT PRODUCTS
SINCE 1888

DE LAVAL
CENTRIFUGAL COMPRESSOR

handles propane-butane for M. W. Kellogg alkylation unit



New Bulletin 0504 gives complete data

On stream at a plant of a large mid-western refiner, this De Laval unit compresses the propane-butane mixture to prepare it for an M. W. Kellogg alkylation unit.

Inlet volume of the De Laval centrifugal compressor is 3,040 cubic feet per minute. Inlet pressure is 13 psia, and discharge pressure 85 psia. This compressor is equipped with De Laval contact-type oil seals. The unit is driven by a 600 bhp turbine running at 7,400 rpm.

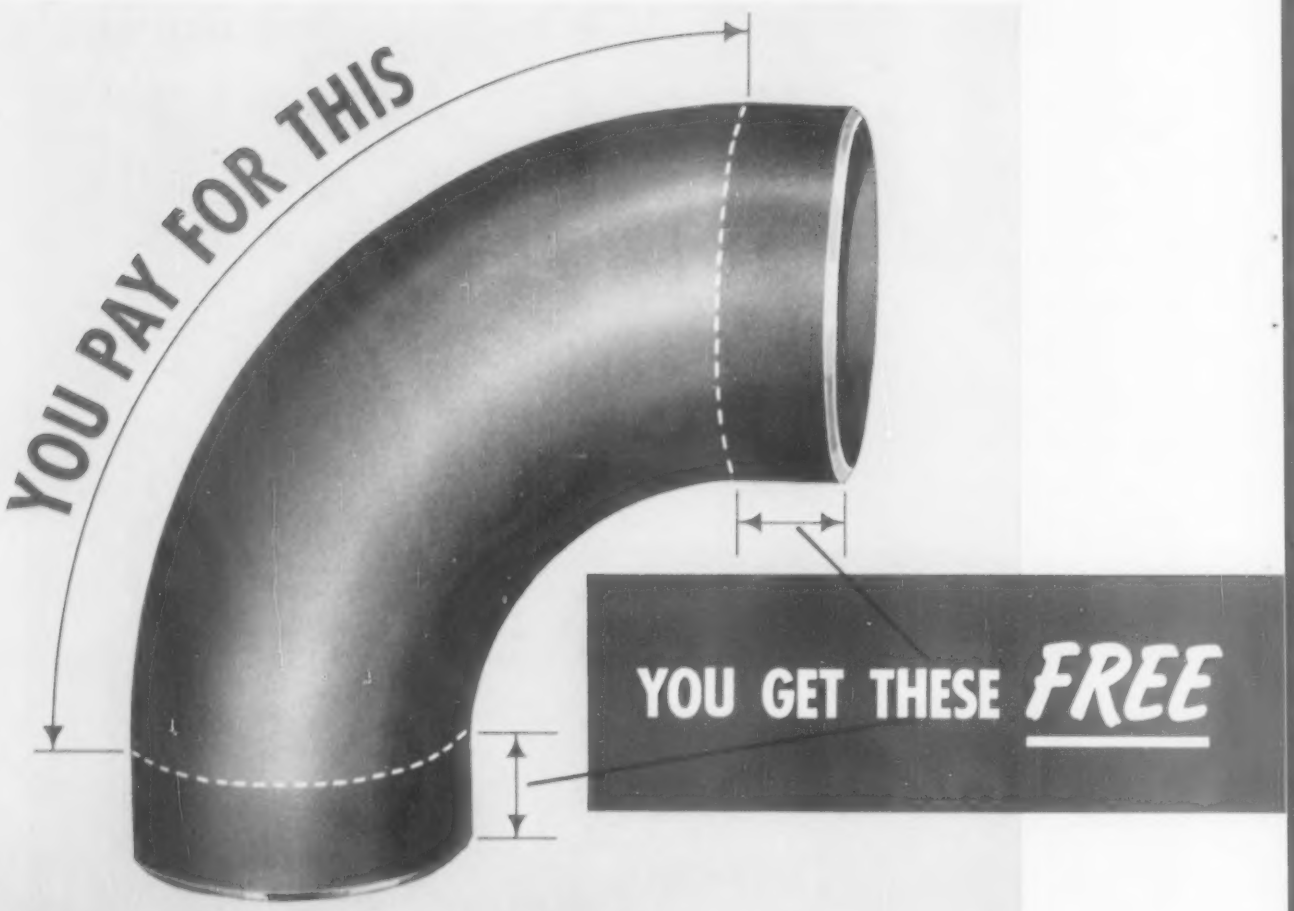
De Laval compressors are designed and built for heavy duty continuous operation. Rugged, horizontally split casings, individually designed impellers, perfectly balanced rotors and externally mounted, cylindrically seated bearings assure optimum performance and long service.

DE LAVAL *Centrifugal Compressors*

DE LAVAL STEAM TURBINE COMPANY
810 Nottingham Way, Trenton 2, New Jersey

DL 508

MIDWEST "LONG TANGENT" ELBOWS



In no other welding elbow do you get this "bonus" of long tangents. The dotted lines show where standard elbows end. Each shaded straight end equals ¼ of the nominal fitting diameter . . . a 12" Midwest "Long Tangent" Elbow has tangents 3" long. As a result of the advantages listed at the right, substantial savings are made on many piping systems by using Midwest "Long Tangent" Elbows . . . which cost no more than other elbows. For further information, write for Catalog 54.

MIDWEST PIPING COMPANY, INC.
Main Office: 1450 South Second Street, St. Louis 4, Mo.
Plants: St. Louis, Passaic and Los Angeles

Sales Offices:
New York 7—50 Church St. • Chicago 3—79 West Monroe St.
Boston 27—426 First St. • Los Angeles 33—520 Anderson St.
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Cleveland 14—616 St. Clair Ave. • Miami 34—2103 Le Jeune Rd.
STOCKING DISTRIBUTORS IN PRINCIPAL CITIES

ADVANTAGES OF MIDWEST "LONG TANGENT" ELBOWS

- ★ They save pipe.
- ★ They often eliminate short nipples and their extra welds.
- ★ They save time and money in lining up and clamping pipe and fitting.
- ★ They make it easier to apply slip-on flanges.
- ★ They remove the circumferential weld from point of maximum stress and can be sleeved.
- ★ THEY COST NO MORE THAN OTHER ELBOWS

MIDWEST HAS THE MOST COMPLETE LINE

7325

MIDWEST WELDING FITTINGS IMPROVE PIPING DESIGN AND REDUCE COSTS

Bendix

GENERAL PURPOSE DIGITAL COMPUTER

FOR ENGINEERING AND SCIENTIFIC COMPUTATION

FASTER
IN COMPUTING TIME

Multiplies in 16.7 milliseconds
Divides in 16.7 milliseconds
Adds in 0.54 millisecond
—including reading of command.

LARGER
IN COMPUTING CAPACITY

2176 word memory. As many as 1,200,000 additional words can be stored in auxiliary magnetic tape units.

SMALLER
IN PHYSICAL SIZE

Approximately equivalent in size to 2 standard 4-drawer filing cabinets. Standard 115V 60 cycle current is used.

LOWEST
IN COST

The modest first cost results from the advanced design of Bendix Aviation Corporation engineers. Low maintenance is assured through conservative use of all electronic components.

. . . AND AVAILABLE NOW!

MAIL THE COUPON OR WRITE FOR COMPLETE INFORMATION

Bendix Computer

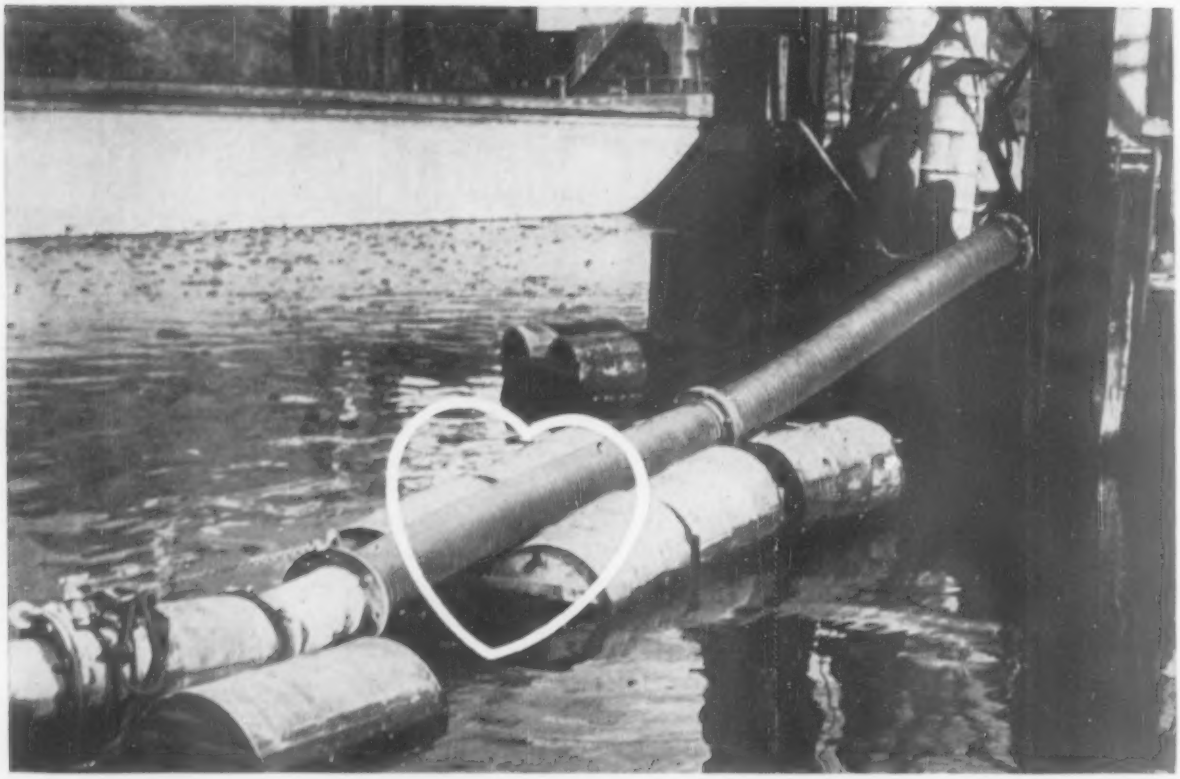
BENDIX COMPUTER DIVISION, Bendix Aviation Corporation
5630 ARBOR VITAE STREET, LOS ANGELES 45, CALIF.

Please send information and prices on your G-15A Computers.

NAME _____ TITLE _____

COMPANY _____ ADDRESS _____

THE BENDIX G-15A WILL BE EXHIBITED IN TULSA AND HOUSTON DURING FEBRUARY. FOR AN INVITATION PLEASE WRITE THE SALES DEPARTMENT.



GIVES AND TAKES...PREVENTS BREAKS

Penflex Metal Hose Lasts As Much As Three Times Longer . . .

Every dredge must have a flexible coupling between the rigid pipes from dredge to land or the motion would break it. Recently a large operator on the Ohio River switched to Penflex from other hose and found his dredging sleeves now last as much as three times longer . . . plus cutting the costs of sleeves.

Penflex Flexible Metallic Tubing is made to stand up and take it under the most severe operating conditions. It is as tight and tough as a pipe, but flexible. Conveys fluids, semi-solids, granular and abrasive materials at the lowest cost per ton or cubic yard. Keeps maintenance and replacement time at a minimum. The extra quality of Penflex pays off in extra service on the job!

Whatever the size of the flexible tubing you need . . . as small as ⅛" ID or as large as 24" ID . . . bronze, steel, galvanized, stainless steel, wire braided . . . for transmitting volatiles or solids Penflex makes them all to fit your requirements. Penflex "Flexineering" assures the right type of flexible metal tubing on each installation for the longest, most economical wear. Write today for your copy of "Flexineering"—see how flexible metallic tubing can cut your costs.

Pennsylvania Flexible Metallic Tubing Company, Inc., 7213 Powers Lane, Philadelphia 42, Penna. • *Branch Sales Offices:* Boston New York • Chicago • Houston • Cleveland and Distributors in Principal Cities

flexineering by

PENFLEX

HEART OF INDUSTRY'S LIFELINES

FLEXIBLE TUBING, AUTOMATIC BARREL FILLERS, PNEUMATIC RIVET PASSERS, ACCESSORIES AND FITTINGS

Veteran Chief takes post-graduate training at Ansul fire school...you can too

Throughout his entire career, Floyd Dumas has practiced what he preached . . . *you can't have too much fire training.* So it was logical that this veteran of 29 years' experience should attend Ansul's Fire Training School. As Chief of Fire Prevention for Parke Davis & Co., one of the nation's leading manufacturers of pharmaceuticals, his responsibilities are tremendous. The information Floyd took home from the Ansul School was passed on to each member of his staff who will be better firefighters for it.

You too can have this training. Ansul is the nation's pioneer in the field of fire training, and the only manufacturer to offer this important service to its customers. It is just one of many "extra" services made available to all Ansul users. And there is no charge whatsoever. Since 1940 this unique school has graduated over 2,800 students from all over this hemisphere, parts of Europe, Asia, and the Middle East.

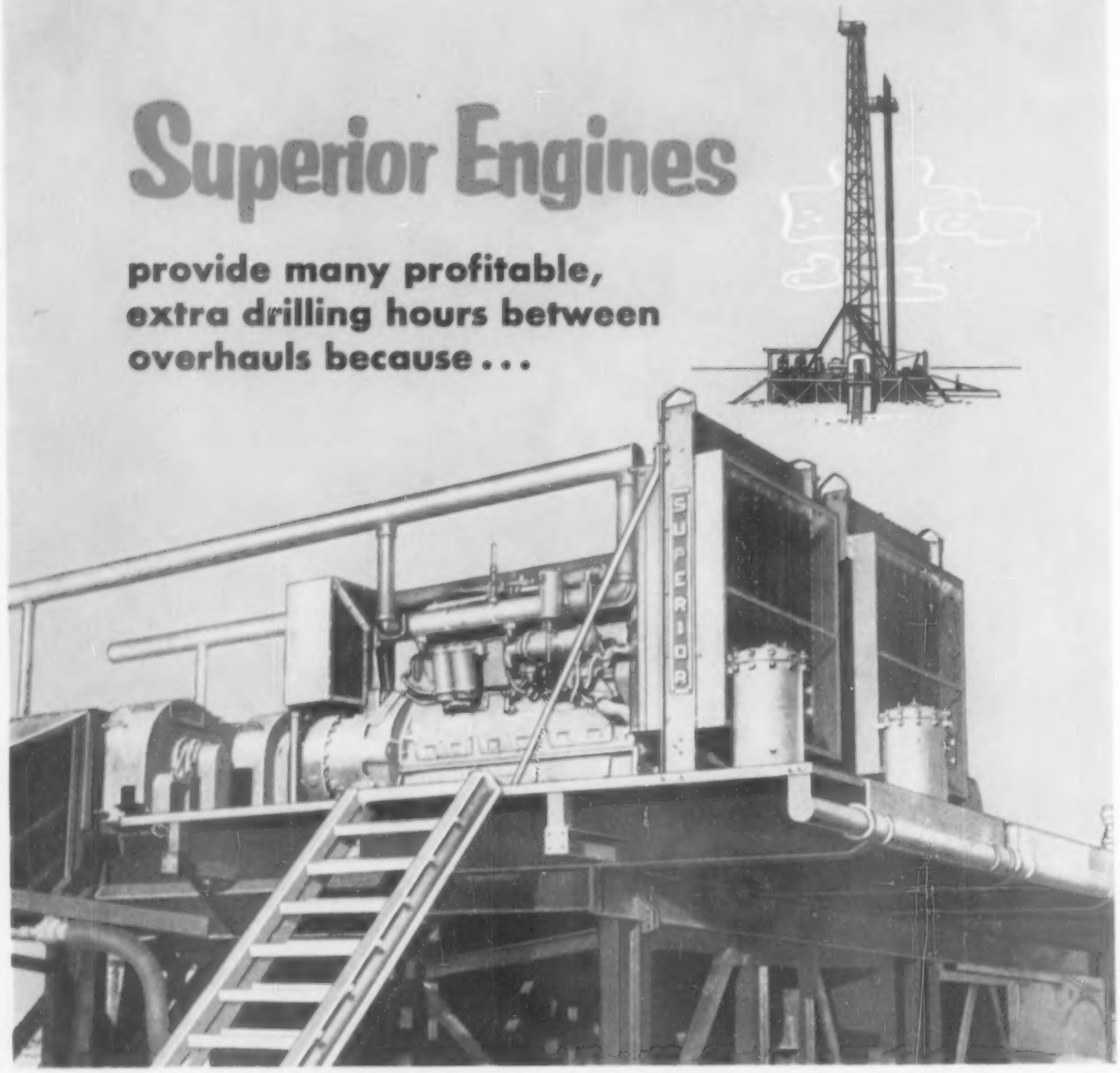
Training at the Ansul Fire School is of the practical kind. The classroom is Ansul's five-acre test field containing all the latest equipment, and staffed by expert instructors. You owe it to your business, to your position, to learn more about the Ansul Fire Training School.

Get in touch with your local ANSUL MAN through the yellow pages of your phone directory, or write to THE ANSUL CHEMICAL COMPANY, DEPT. OG-1, MARINETTE, WISCONSIN.

ANSUL

Superior Engines

provide many profitable, extra drilling hours between overhauls because . . .



Superior Diesel or Dual Fuel Drilling Engines are available from 300 to 650 Continuous B.H.P., Superior Gas Drilling Engines from 320 to 630 Continuous B.H.P.

Great engine accessibility and simple rugged construction make routine maintenance quick and easy—right on the rig! Features such as dynamically balanced crankshaft, heavily reinforced cylinder block, individual cylinder heads and fuel pumps for greater dependability, and sturdy engine bed which takes the Diesel firing thrust, to mention a few, greatly lengthen the time between engine overhauls.

Case histories prove, when Superior engines finally need overhauls, they require few major part replacements . . . down time and maintenance costs are cut to a minimum.

Buy Superior Engines and you make a superior investment! Get all the facts from leading rig manufacturers, or through White Diesel field representatives available in all oil field areas or through White Diesel Engine Division.

WHITE DIESEL ENGINE DIVISION

THE WHITE MOTOR COMPANY • *Plant and General Offices: Springfield, Ohio*

Superior ENGINES · ATLAS Imperial DIESEL ENGINES · White DIESEL

THE NEW **CHIKSAN**

Hydraulically Controlled

MARINE LOADING ARM

The first basic improvement for loading and unloading of petroleum products in over 30 years.

- Speeds tanker turn-around-time
- Far less manpower to operate
- Long life, trouble free operation
- Elimination of hose bursts
- Lowers fire and work compensation premiums
- Operates from −60°F. to +225°F.
- One motor, one switch controls operation
- Static and spark resistant
- No manhandling of hose

CHIKSAN

A SUBSIDIARY OF FOOD MACHINERY AND CHEMICAL CORPORATION

fmc

CHIKSAN COMPANY; Brea, California

Please send me more information on the Chiksan Marine Loading Arm.

Name_____

Company_____

Address_____

City_____ Zone___ State_____

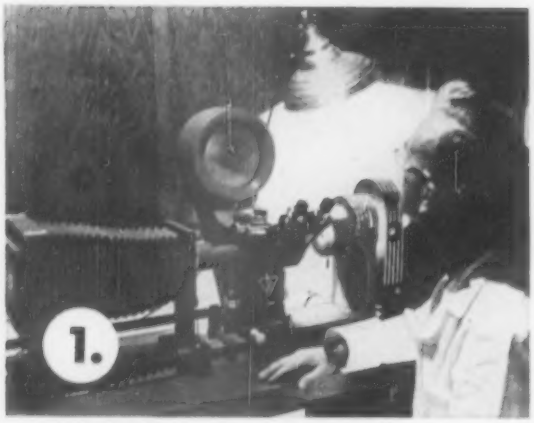
312

CHIKSAN **CHIKSAN COMPANY** — BREA, CALIFORNIA • CHICAGO 3, ILLINOIS • NEWARK 2, NEW JERSEY

Well Equipment Mfg. Corp. (Division), Houston 1, Texas - Subsidiaries: Chiksan Export Co., Brea, Calif., Newark 2, N. J. - Chiksan of Canada, Ltd., Edmonton, A

Tuffy® Tips

Here Are Some Of The Steps Taken To Pre-Determine Tuffy Toughness And Assure Longer Rope Life



1. Metallographic Examination. Under powerful magnification, Union Wire metallurgists examine the microstructure of the steel in rods and wires to see that rigid specifications are met and maintained in processing.

2. Chemical Analysis Laboratory. Steel for Union Wire Rope is made to rigid specifications. Here rods and wire are chemically analyzed to make certain that the correct combinations of carbon, manganese, etc., are kept under control.

3. Designed by Union Wire Rope Engineers. This accelerated fatigue tester is equipped with sheaves from 8" to 24" permitting application of any bending stress. Tensile loads up to 12,000 lbs. are applied. Thus wire rope life under toughest fatigue conditions is pre-determined.

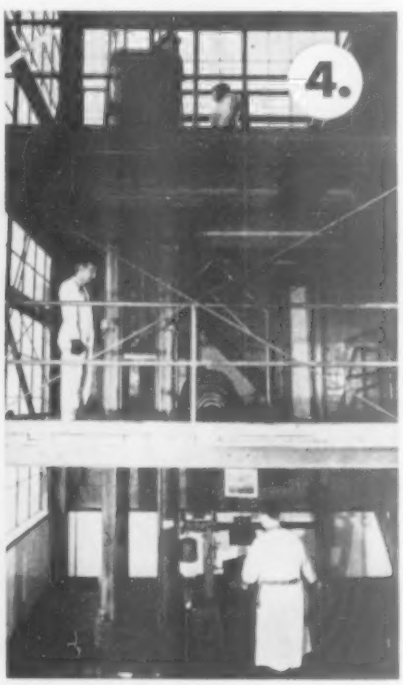
4. Rope Testing Machine. This 3-story high machine is designed to test and record the breaking strength of the rope when finished and ready for the customer.

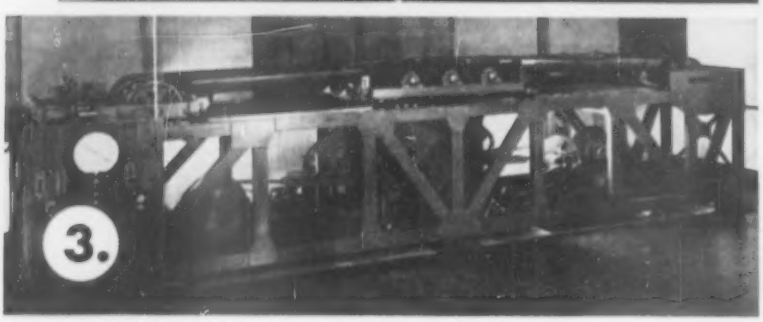
5. Static Flexibility Tester. The demand of machinery engineers toward smaller sheaves and higher speed made it necessary for Union Wire Rope Engineers to adapt this standard machine in order to test static flexibility.

6. Wire Tensile & Torsion Tester. In tension and under torsion, this machine tests wires to see that they measure up to the extraordinary high level of strength and toughness mandatory in Union Wire Rope.

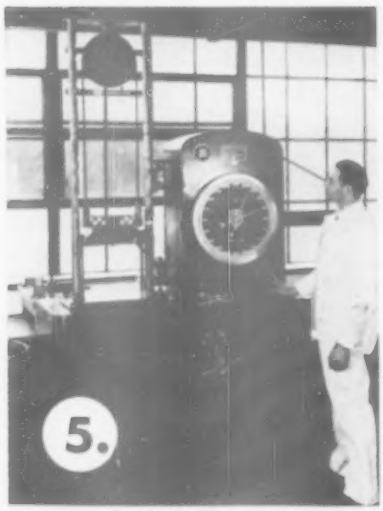
7. Another View Of Accelerated Fatigue Tester. Shows simultaneous testing of three different wire rope constructions. Here, in days, ropes are subjected to punishment equal to weeks or months of hard service.

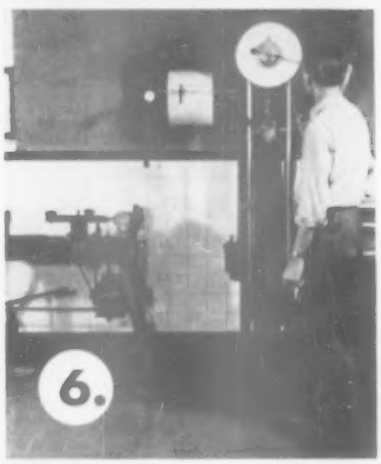
8. Wire Fatigue Testers. The fatigue strength of wire rope is the sum total of the fatigue strength of the wires in its construction. Here, the wires in tension and bending are tested for fatigue strength.

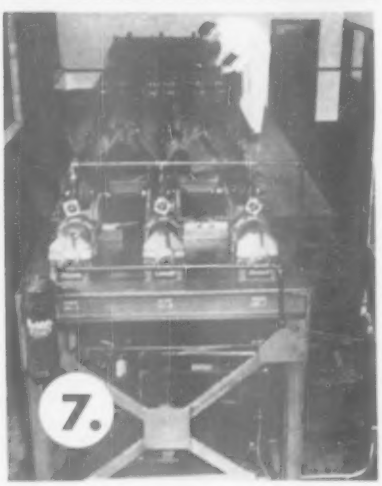




How Research Puts Longer Service Life Into WIRE ROPE







When you specify one of the Tuffy Wire Ropes, you can say Tuffy and forget complicated specifications

Standard...

For use with standard rigs drilling in any and all formations. Also for deep drilling beyond 6000 ft. with jackknife rigs. Spools easily, pays off by delivering more ton-miles before cutting is necessary.

Tuffy Rotary Lines

Ton-Mile Indicator and Log Book. Provides you with a slide-chart method of figuring ton-miles quickly and easily, and with it you get a log book in which to record your ton-mile record.

Cut-Off Practice Book. Outlines the quick easy way to tell when to cut-off and how much. Shows how to obtain maximum service from rotary lines and avoid cutting too much, too soon or too little too late. Carries cut-off tables for derricks of all heights with the various draw works operating in all the major oil territories.

Handbook of Wire Rope for Well Drilling and Servicing. More than 40 pages of useful facts on wire rope for rotary, cable tool drilling and well servicing. Includes sizes and constructions of wire rope for all oil field services, its care, lubrication, abuses, correct handling, seizing and socketing.

Or Jackknife

An extra-flexible rope, spools smoothly on small sheave and drums of jackknife rigs drilling to 6000 feet. Top flight performer on rigs of all types throughout the oil country.

Write Today for FREE Copies!

Your Tuffy Distributor Works For You

He's the man who can help you find a fast answer to all your wire rope problems. He's also the man who often knows as much about some requirements of your equipment as the men who made it. He's the man who's eager to supply the kind of service that will hold your patronage. Feel free to call on him anytime.

union Wire Rope corp.

2102 Manchester Avenue Kansas City 26, Missouri

Specialists in high carbon wire, wire rope, braided wire fabric, stress relieved wire and strand

THE CASE OF THE RECALCITRANT TUBE

FACTS: High pressure, high temperature refinery application (hydrogenation of petroleum)
Tubing in question was stainless type 347
Tubing met original specification for job

CLUES: Tubing was in service for about 100 hours at a pressure of 10,000 psi and a temperature of 1100 F, before failure.

EXAMINATION REVEALED: Temperatures and/or pressures used in actual testing or operation exceeded the original specifications
Failure resulted from progressive wall thinning due to creep

POSSIBLE SOLUTIONS: Change operating conditions
Use a thicker wall tube. Change tube material

B&W SUGGESTION: When it comes to choosing a tube, consider *every* factor involved, including possibility of exceeding current service conditions. *And* get the benefits of Mr. Tubes' long experience with tubing for every kind of application. He knows his tubes—what they will and what they won't do. Call him in at any time. He's as close as the phone at your elbow.

TA-5066 P

THE BABCOCK & WILCOX COMPANY
TUBULAR PRODUCTS DIVISION, BEAVER FALLS, PA.

Seamless and Welded Tubular Products, Seamless Welding Fittings and Flanges—in Carbon, Alloy and Stainless Steels

You can do it CHEAPER with UTILITY Electric Power

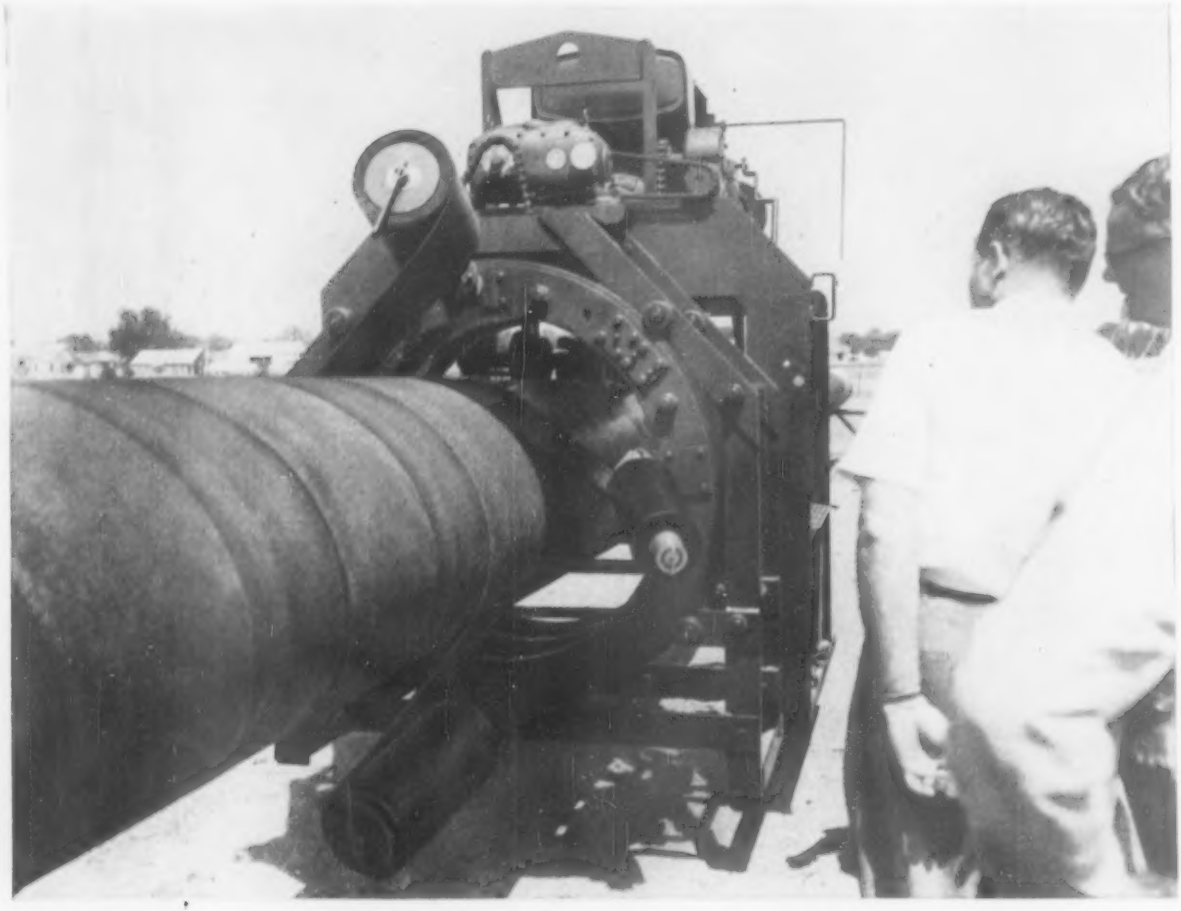
Multiply These Installations by Thousands...

and you'll readily see why operators favor Utility Electric Power. Field after field of pumping wells are NOW COMPLETELY ELECTRIFIED. With wells powered AUTOMATICALLY by Utility Electric Power these operators have the added advantages of less manpower, less maintenance, and less over-all operating costs. Be sure of power when and where you need it... but be sure you make it Low Cost Utility Electric Power.

Petroleum Electric Power Association

P. O. BOX 2771, DALLAS, TEXAS

AUTOMATIC CONTROL LESS MANPOWER
AUTOMATIC CONTROL LESS MANPOWER
CALL YOUR LOCAL ELECTRIC SERVICE COMPANY FOR POWER FACTS
ORGANIZED IN THE INTEREST OF GREATER SERVICE TO THE PETROLEUM INDUSTRY



HOW MUCH CAN YOU SAVE

if you protect your pipeline with Polyken Protective Tape Coatings?

MORE—PROBABLY A LOT MORE THAN YOU THINK.

We wouldn't want you to assume that *Polyken* Protective Tape Coatings are priced lower than all other coatings. They aren't, and may sometimes even cost a little more applied than lower quality coatings.

But here are 6 reasons why we *can* promise a substantial saving:

1. *Polyken* controlled strength—careful control in the selection and processing of raw materials;
2. Uniform thickness and quality;
3. Rugged, long-lasting protection from corrosion;
4. Application right from the roll—no heat, thinners, or solvents, no drying or clean-up time required;
5. High speed, low-labor power taping for "big inch" as well as "littlest inch" installations;
6. Lowest equipment investment and manpower costs possible.

Of course we can't figure your costs here in dollars and cents. But show us your plans—and we suspect you'll be surprised at how much you can save on dependable protection.

Let's talk it over now. See our complete catalog in Sweet's Industrial Construction File or write, wire, or phone *Polyken*, 222 W. Adams Street, Dept. OG-A, Chicago 6, Illinois, RAndolph 6-4250.

Polyken®

CONTROLLED STRENGTH

PROTECTIVE COATINGS

THE KENDALL CO., POLYKEN SALES DIVISION

RESOLUTION: Take No Chances in '56

Now is an excellent time to take stock of your drilling control equipment. Weed out and replace old and obsolete units. It's sound economy to protect your big investment with the best control equipment available.

Blowout prevention is a procedure. Make it a routine part of your drilling progress:

1. Be sure that your drilling control units are of adequate capacity to safely withstand the anticipated pressures.
2. Maintenance should begin *before* a new well is spudded, with careful internal inspection of each preventer. The importance of an operational test during every tour cannot be overstressed.
3. Crew members should not be allowed to become complacent to the ever-present danger of a blowout.

For thirty-five years, Cameron has been the acknowledged leader in the drilling control equipment field. Take no chances, take Cameron . . . every time.

Cameron

IRON WORKS, INC.

P. O. Box 1212 · Houston, Texas

Export Office: 7912 Empire State Bldg., New York City. In England: Cameron Iron Works Ltd., Time & Life Bldg., New Bond Street, London W. 1 England

THIS IS CAMERON'S 35th YEAR OF SERVICE TO THE INDUSTRY

ALL AROUND THE WORLD . . . YOU WILL SEE

PROCON BUILDING

Forgive us for paraphrasing a trite slogan but actually "The sun never sets on a Procon construction project." From a refinery in Australia to a petrochemical plant in England, the world around . . . Procon is building.

The broad experience gained, the highly skilled personnel developed in Procon's wide-spread arena of operation, can be harnessed to your construction problems —to give you full confidence in a job done rigidly to specifications and time requirements.

Our engineering staff will be glad to explain specifically how Procon's complete design, engineering and construction service can provide so satisfactory an answer to your building requirements.

PROCON *Incorporated*

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PROCON (*Canada*)
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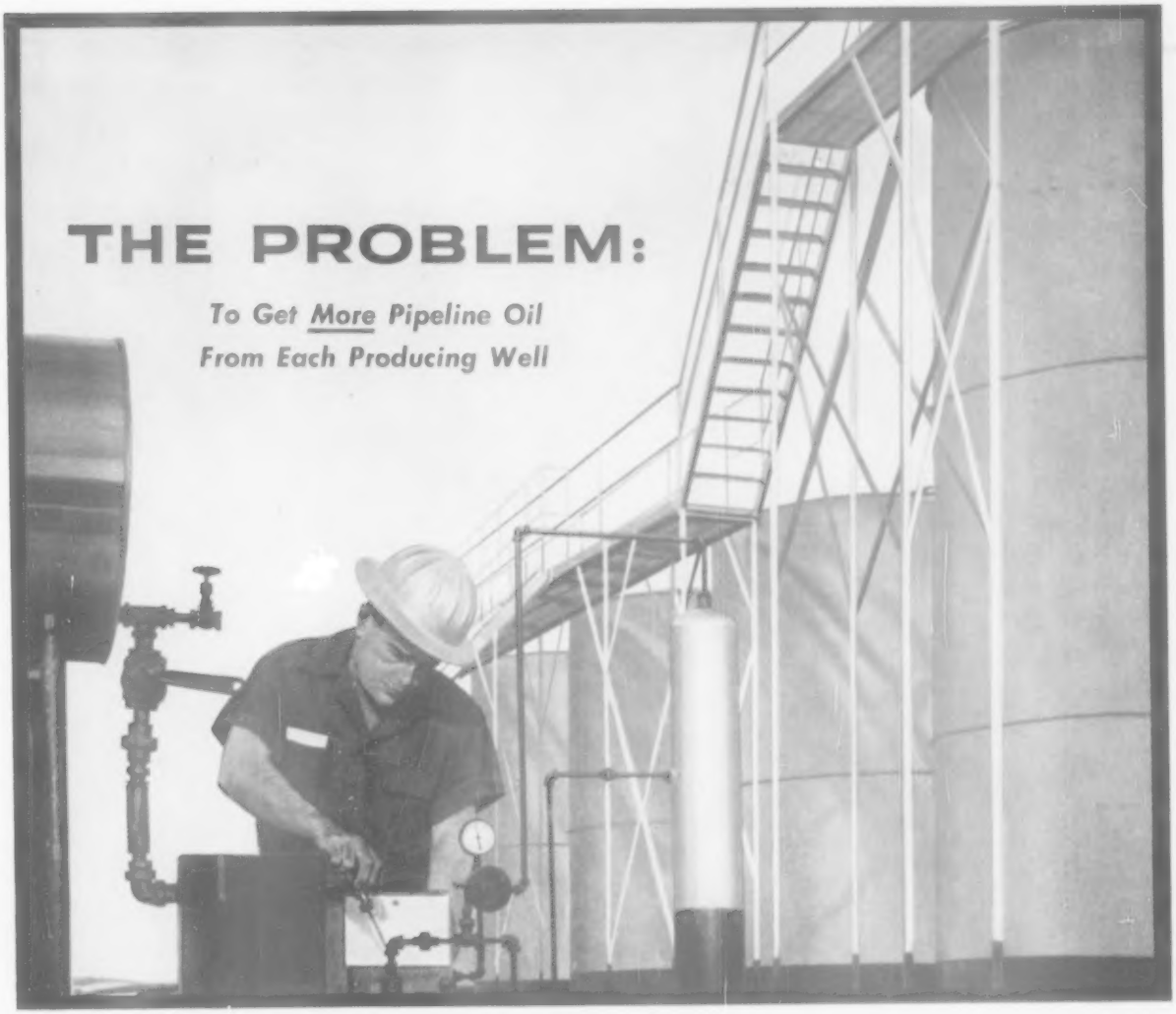
WORLD-WIDE CONSTRUCTION FOR THE PETROLEUM, PETROCHEMICAL, AND CHEMICAL INDUSTRIES



THE SOLUTION: *Humble's Efficient Emulsion Breakers—* BREAXIT

At your request a *Breaxit* engineer will make on-the-lease tests of your emulsified oil and recommend the type and amount of *Breaxit* to turn emulsions into pipeline oil. This on-the-spot testing is an extra Humble service without cost or obligation.

Companies that have used *Breaxit* to break crude oil emulsions report important savings through lowered treating cost and increased recovery.

For complete information on *Breaxit*, see your nearest Humble wholesale plant in Texas and New Mexico, or write or phone:

Technical Service,
Sales Department,
Humble Oil & Refining Company,
P. O. Box 2180, Houston 1, Texas.

HUMBLE

HUMBLE OIL & REFINING COMPANY

U. S. Rubber announces another major advancement in OIL DOCK HOSE!

NEW U. S. AMAZON H-1818 Lighter Weight Suction & Discharge Hose Speeds Header Make-up, Cuts Dock-Side Time!

TWICE AS FLEXIBLE... visible proof that the new H-1818 (left) —with the same 200 lb. operating pressure rating as conventional hose (right)—is *twice as flexible!* In addition, H-1818 *weighs one-third less* per foot, has *50% lighter ends*, and provides the *greatest hydrostatic values* ever!

GET HOSE SUCTION LINES flowing quicker with this far more flexible, lighter-to-handle hose. The 8" i.d., for instance, has a bending radius of 3 feet, weighs but 18½ lbs. per foot (instead of 30 lbs.) and comes with metal connections weighing only 85½ lbs. (rather than 175 lbs.!)

The new U. S. AMAZON H-1818 Lighter Weight Suction & Discharge Hose provides—

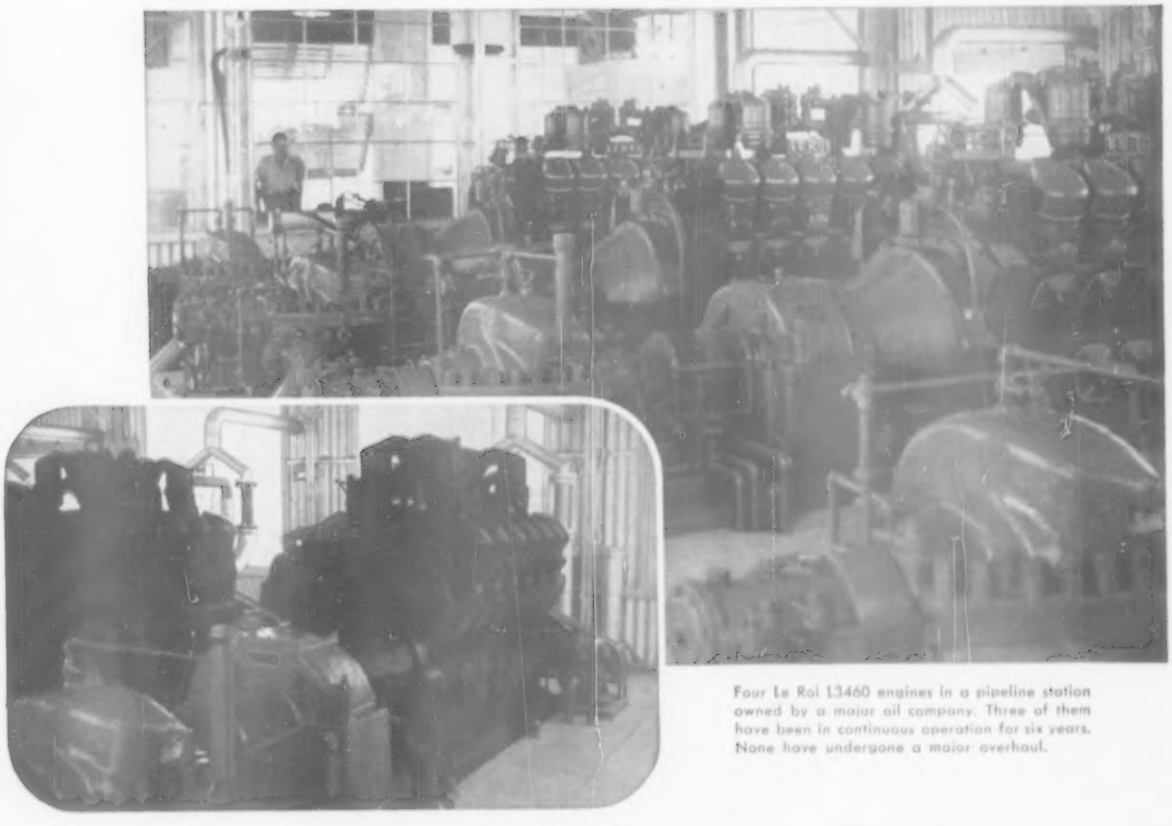
- **Easy Handling—lighter weight and ready flexibility.**
- **Ultimate Hydrostatic Values—up to 75% higher than conventional dock hose.**
- **Greatest Safety—harmless seepage, rather than sudden burst, when hose has served its time.**
- **Positive Static Connection Through Body Wires—eliminates possibility of static bond failure.**
- **Highest Crush Resistance—with greatest flexibility.**
- **Smooth or Corrugated Covers—smooth for repeated rough moving; corrugated for more permanent installations.**
- **Lightweight Steel Nipples—with forged aluminum, bronze, steel, or cast iron flanges—as ordered.**

U. S. Amazon H-1818 is obtainable through any of our 27 District Sales Offices or write to us at Rockefeller Center, New York 20, New York.

US RUBBER

Mechanical Goods Division

United States Rubber



Four Le Roi L3460 engines in a pipeline station owned by a major oil company. Three of them have been in continuous operation for six years. None have undergone a major overhaul.

Power-Packed Pipeline Station

. . . uses Le Roi L3460's to provide plenty of low-cost pumping power

Le Roi's L3460 with 600 max. hp. and its bigger brother, the L4000 with 655 max. hp., are ideal for pipeline service on many counts. Here's why:

Plenty of power with good fuel economy — These engines develop 600 and 655 max. hp. with rock-bottom fuel consumption, and can be run on natural gas, gasoline, or butane. Advanced design manifolding, low friction bearings, and low power loss to accessories, all contribute to unusual operating economy.

Long engine life—Perhaps the best proof of this statement is found in the trouble-free performance experienced by users in installations like the one shown above. Basically the L3460 and L4000 are compact, high-output engines designed with short stroke to give you greater horsepower and speed, without compromising engine life. And that's exactly what they do for you.

More comfortable operating conditions—Water-cooled exhaust manifold cuts down engine heat in operating areas, yet provides fast engine warm-up. The smooth, clean lines of these engines prevent dirt from collecting —that's why they are so easy to keep clean.

Compact V-12 design packs a lot of horsepower in a small space—to give you more horsepower per dollar. This, plus vibrationless performance, reduces foundation costs, simplifies installation.

We think that if you see an L3460 or L4000 in operation you'll agree that they provide the answer to low-cost pumping power. Have your supply house or Le Roi distributor show you one at work. Bulletins are available upon request—just write us.

P-149

LE ROI *Division of Westinghouse Air Brake Co.*

Milwaukee 1, Wisconsin

PORTABLE AIR COMPRESSORS · TRACTAIR · STATIONARY AIR COMPRESSORS · AIR TOOLS · ENGINES

STATEMENT OF CONDITION- *December 31, 1955*

RESOURCES

Cash and Due from Banks	$251,407,263.51
U. S. Government Securities	99,046,177.87
State, Municipal and Other Securities	8,460,263.50
Stock in Federal Reserve Bank	2,100,000.00
Loans and Discounts	427,228,291.12
Loans Guaranteed or Insured by U. S. Government or its Agencies	14,065,306.26
Bank Building and Equipment	19,327,639.84
Bills of Exchange and Commodity Loans	25,859,933.66
Acceptances and Letters of Credit	15,952,976.35
Other Assets	921,829.41
TOTAL	$864,369,681.52

LIABILITIES

Capital	$ 30,600,000.00	
Surplus	39,400,000.00	
Undivided Profits	4,137,038.24	74,137,038.24
Res. for Dividend, Payable Jan. 2, 1956		357,000.00
Reserve for Contingencies		8,389,625.90
Reserve for Taxes, Etc.		4,885,123.57
Acceptances and Letters of Credit		17,623,976.35
Deposits:		
Individual	$501,500,589.37	
Banks	228,540,903.26	
U. S. Government	28,935,424.83	758,976,917.46
TOTAL		$864,369,681.52

REPUBLIC
NATIONAL BANK of Dallas
MEMBER FEDERAL DEPOSIT INSURANCE CORPORATION

Financial Center of the Southwest . .

CAPITAL & SURPLUS $70,000,000 | LARGEST IN THE SOUTH

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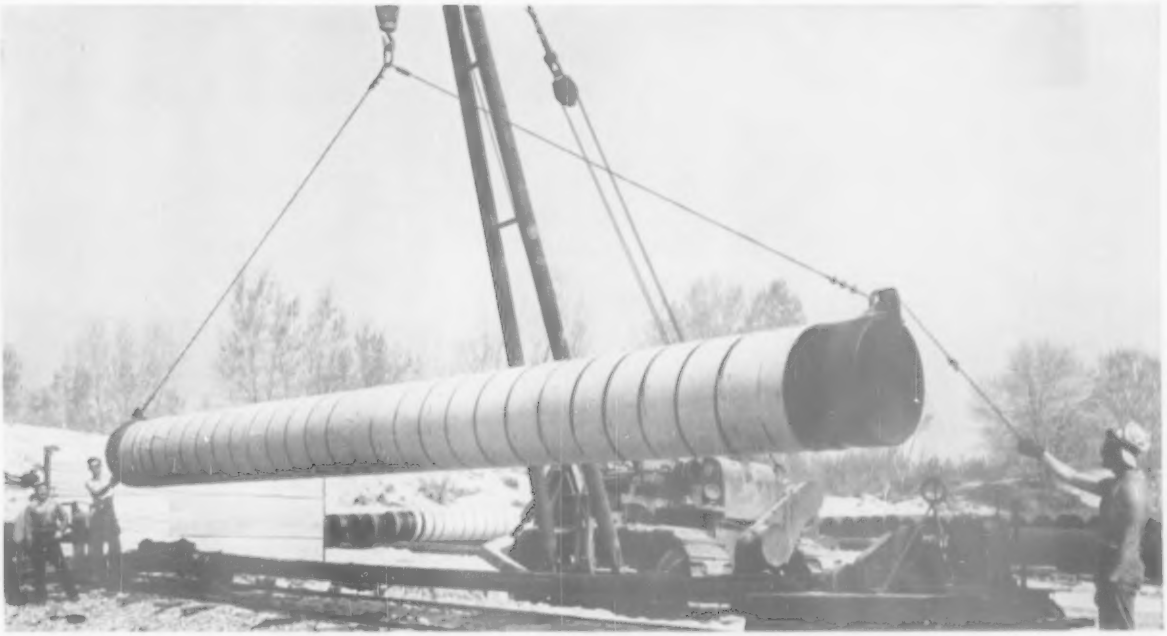
Alert . .

Friendly . .

Efficient!



KING SIZE PROTECTION: 36" pipe, mill coated first with NO-OX-ID 6X for bonded insulation against moisture, then shielded with No. 7 NO-OX-IDized Wrapper and Service Coat for added electrical resistance and protection against soil stress. Finally, a kraft wrap to protect from damage in handling operations. This is long-term pipeline protection at its best.

WHERE ELBOW ROOM IS SCARCE: In crowded work space, No. 4 NO-OX-IDized Reinforced Fabric Wrapper is hand applied around irregular fittings such as valve manifolds on gas lines. No. 4 Wrapper, a coated fabric laminated to a plastic membrane, provides moisture-proof seal over pipe coating.

PROTECTION BY THE MILE: A NO-OX-ID coating combination is uniformly applied over-the-ditch by this traveling type machine. The NO-OX-ID 6X Base Coating is covered with an unbroken shield of No. 7 NO-OX-IDized Wrapper. The fabric side of the wrapper is an excellent surface for bonding a service coat.

NO-OX-ID PROTECTS...EVERYWHERE

Wherever pipelines go—into long or short line service, through rough terrain or rolling plains—there is a NO-OX-ID coating combination plus a method of application for long-term protection against corrosion.

WRITE FOR BULLETIN "Protecting Underground Pipe from Corrosion with NO-OX-ID and NO-OX-IDized Wrappers" tells the story. Your copy is ready upon request.

Dearborn Chemical Company, Dept. OG
Merchandise Mart Plaza, Chicago 54, Ill.

Gentlemen:
Please send my copy of "Protecting Underground Pipe from Corrosion with NO-OX-ID and NO-OX-IDized Wrappers."

Name ..... Title .....

Company .....

City ..... Zone ... State .....

Dearborn NO-OX-ID

Protecting Metal Against Corrosion Since 1887

The Hose that Worry-Proofs your Rotary Rig

The R/M method of applying high tensile steel cable wires under precisioned tension makes Ray-Man CBL Rotary Hose unequalled for strength, flexibility and safety. Because Ray-Man CBL Rotary Hose is flexible without being bulky, it is easier to transport and make up in the rig . . . with unusual freedom from kinking and high resistance to accidental crushing. Also it holds steadier in the derrick without whipping . . . even under the pressures of deep drilling operations. The R/M streamlined, built-in coupling adds to the safety of using Ray-Man CBL Rotary Hose. It is designed without protruding lugs or flanges . . . nothing to cause fouling or damage. The leak-proof, blow-out-proof "Lip-Lok" Seal tightens under pressure. You get the highest safety factor, longest life and lowest cost per foot drilled . . . "More Use per Dollar" . . . with Ray-Man CBL Rotary Hose. Write for Bulletin #6743.

CONDOR V-BELTS
R/M SUPER-POWER V-BELTS

Let an R/M representative show you how Condor V-Belts and R/M Super-Power V-Belts are engineered to give you "More Use per Dollar" on deep drilling operations . . . or write for Bulletins #6868 and #6628.

R/M POLY-V® DRIVES

This new concept of heavy duty power transmission eliminates V-belt matching problems . . . delivers up to 50% more power in the same space as regular V-belts—or equal power in less space! Write for Poly-V* Drive Bulletin #6638.

*Poly-V is a registered Raybestos-Manhattan trade-mark

MANHATTAN RUBBER DIVISION—PASSAIC, NEW JERSEY

RAYBESTOS-MANHATTAN, INC.

Other R/M products include: Industrial Rubber • Fan Belts • Radiator Hose • Brake Linings • Brake Blocks • Clutch Facings • Asbestos Textiles • Packings • Engineered Plastic, and Sintered Metal Products • Laundry Pads and Covers • Bowling Balls

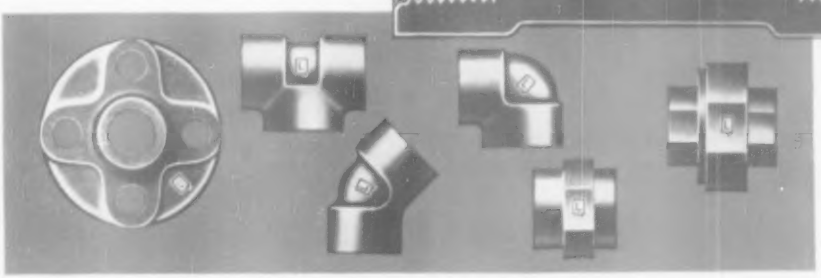
LUNCOR PVC VALVES REPLACE HIGH-ALLOY VALVES

Also Replace Valves Lined With Glass, Porcelain, Stoneware, Hard Rubber At Substantial Savings

LUNCOR is the first all-molded PVC valve designed and engineered by a valve manufacturer. LUNCOR PVC is a strong, rigid type of unplasticized polyvinyl chloride. The valve design has been created to take full advantage of the properties of PVC. LUNCOR PVC can be molded to precise tolerances and is remarkably corrosion-resistant, odorless, tasteless, non-toxic, non-porous, non-contaminating, and weighs only one-sixth as much as metal. The new valve, with its full line of fittings, permits ready installation of complete plastic piping systems.

Every part is made of all molded LUNCOR PVC . . . body, bonnet, disc, stem, and handwheel. Packing is self-lubricating Teflon.

FIG. 2600
125 WP
140°F.



LUNCOR FITTINGS

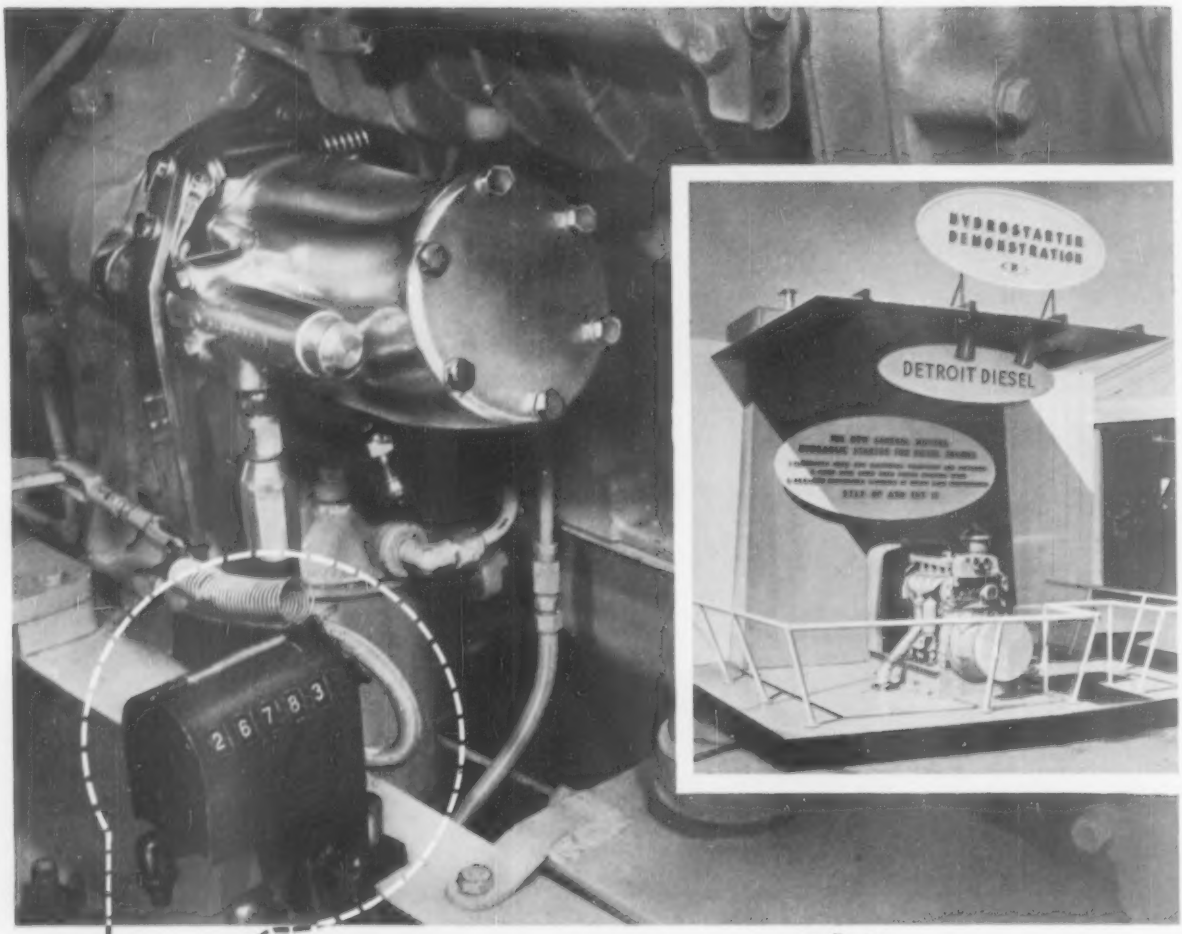
The complete line of fittings which complements the new LUNCOR Valve includes: caps, couplings, plugs, unions, reducing bushings, flanges, elbows, and tees. LUNCOR Fittings are made of the same high-quality rigid polyvinyl chloride as the Lunkenheimer LUNCOR Valve.

REQUEST LITERATURE FROM YOUR LUNKENHEIMER DISTRIBUTOR OR FROM THE LUNKENHEIMER COMPANY, BOX 360, CINCINNATI 14, OHIO.

LUNKENHEIMER®

THE ONE *Great* NAME IN VALVES

L 255-16



26,783 Starts in 26 days at GM Powerama!

HERE'S PROOF of the rugged dependability of a General Motors Hydrostarter—the new, low-cost hydraulic starting system now available on all GM Detroit Diesel engines:

> On public demonstration at the GM Powerama, a Hydrostarter started a GM Detroit Diesel 26,783 times in 26 days—an average of more than 1,000 starts per 12-hour day—more than 1 start every minute.

A Hydrostarter gets a GM Detroit Diesel up to starting speeds 80% faster than regular starting systems—costs less to maintain than electric starters—sells for a far lower price than any other non-electric Diesel starter.

And it gives you fast, sure starts—even at sub-zero temperatures, or when your equipment has been standing idle for long periods of time.

Call your GM Diesel Distributor for full details on the GM Hydrostarter—or write direct for more information.

DETROIT DIESEL

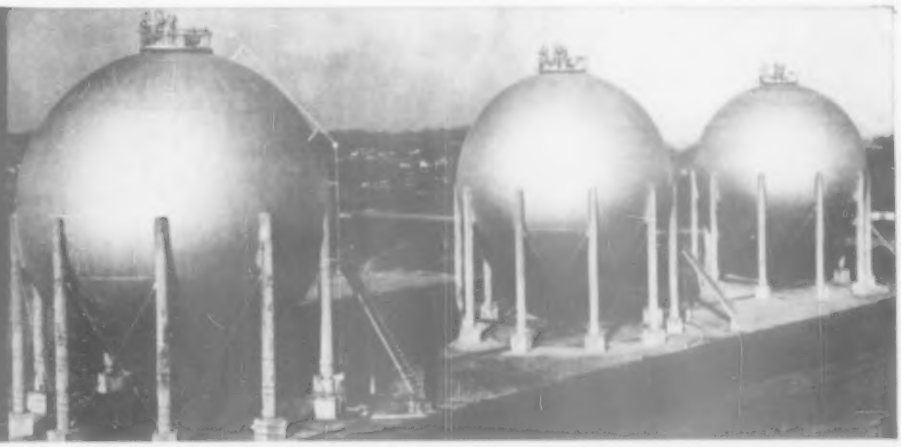
Engine Division of
General Motors

Single Engines . . . 30 to 300 H.P.
Multiple Units . . . Up to 893 H.P.

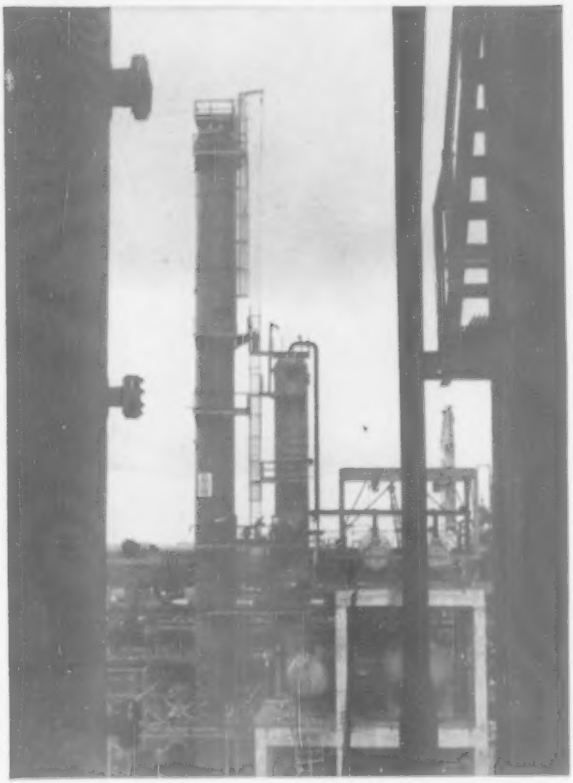
America's Largest Builder of Diesel Engines

GRAVER

...Serving the petroleum industry



Graverspheres are your answer to high-pressure storage needs. Constructed to Graver's exacting standards, these spheres are available in capacities to 20,000 bbl.



Fractionating towers...intricate process vessels—all reveal the inherent fabricating skill of Graver craftsmen. Graver works in carbon steel, stainless, nickel-clad, Hastelloy and aluminum.

at Refineries...
Petrochemical plants

GRAVER®

Craftsmanship is in demand

GRAVER TANK & MFG. CO., INC.
East Chicago, Indiana

CHICAGO • NEW YORK • PHILADELPHIA • EDGE MOOR, DELAWARE
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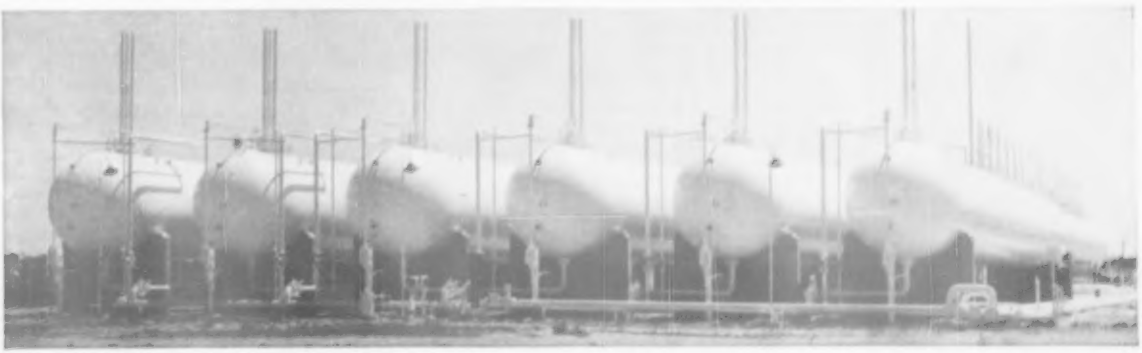
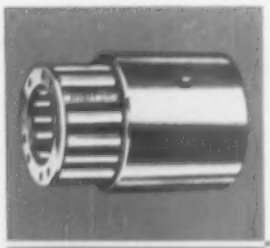
CASPER, WYOMING • LOS ANGELES • FONTANA, CALIFORNIA • SAN FRANCISCO

Graver-built butane and propane storage tanks are popular throughout the country. They meet and exceed all the standards required for difficult and specialized purposes.





TRUNNIONED ROLLER CAGE—Economical for volume use on thin-annulus bearings. End rings are hardened steel stampings, connected by riveted bars interspersed between rollers to form an integral unit. Races can be omitted if desired.

POCKETED END RING CAGE—Designed for fairly large bore bearings in heavy-duty service. Rollers are guided accurately by pockets drilled in bronze end rings. Riveted connecting bars form an integral unit, so races can be omitted if desired.

STAMPED STEEL SEPARATOR—Economical for volume use on wide range of bearings with short rollers. A single steel stamping with bars coined to conform to roller contour. Simple, open design assures large lubricant capacity and good circulation.

FORMED BAR CAGE—Well adapted for volume use on heavy-duty bearings. Hardened steel end rings are connected by cold-rolled shaped bars conforming to roller diameter. Insures quiet operation, better roller guidance, and the smooth surface of bars protects rollers.

DRILLED POCKET CAGE—Used on better-grade bearings to provide extremely close control of rollers, which operate in pockets drilled and reamed in bronze cylinder. Riveted ring on one end retains rollers permanently, so races may be omitted if desired.

SEPARABLE BROACHED POCKET CAGE—Used only on finest high-speed bearings. An integral bronze cylinder with pockets broached for maximum uniformity. Insures minimum friction, better oil circulation for cooling. Rollers can be removed for inspection.

NON-SEPARABLE BROACHED POCKET CAGE—Similar to the above and offers all the same operating advantages. Used for "blind" installations where rollers must be retained with inner or outer race. Roller drop controlled by deforming bars after rollers are placed.

What makes a cylindrical roller bearing good?

When you buy a roller bearing, you expect it to do a certain job for you. How well it does that job depends on many different factors. This series of messages is designed to help you recognize some of these important differences and get more for your bearing dollar.

The RIGHT KIND OF RETAINERS for the application

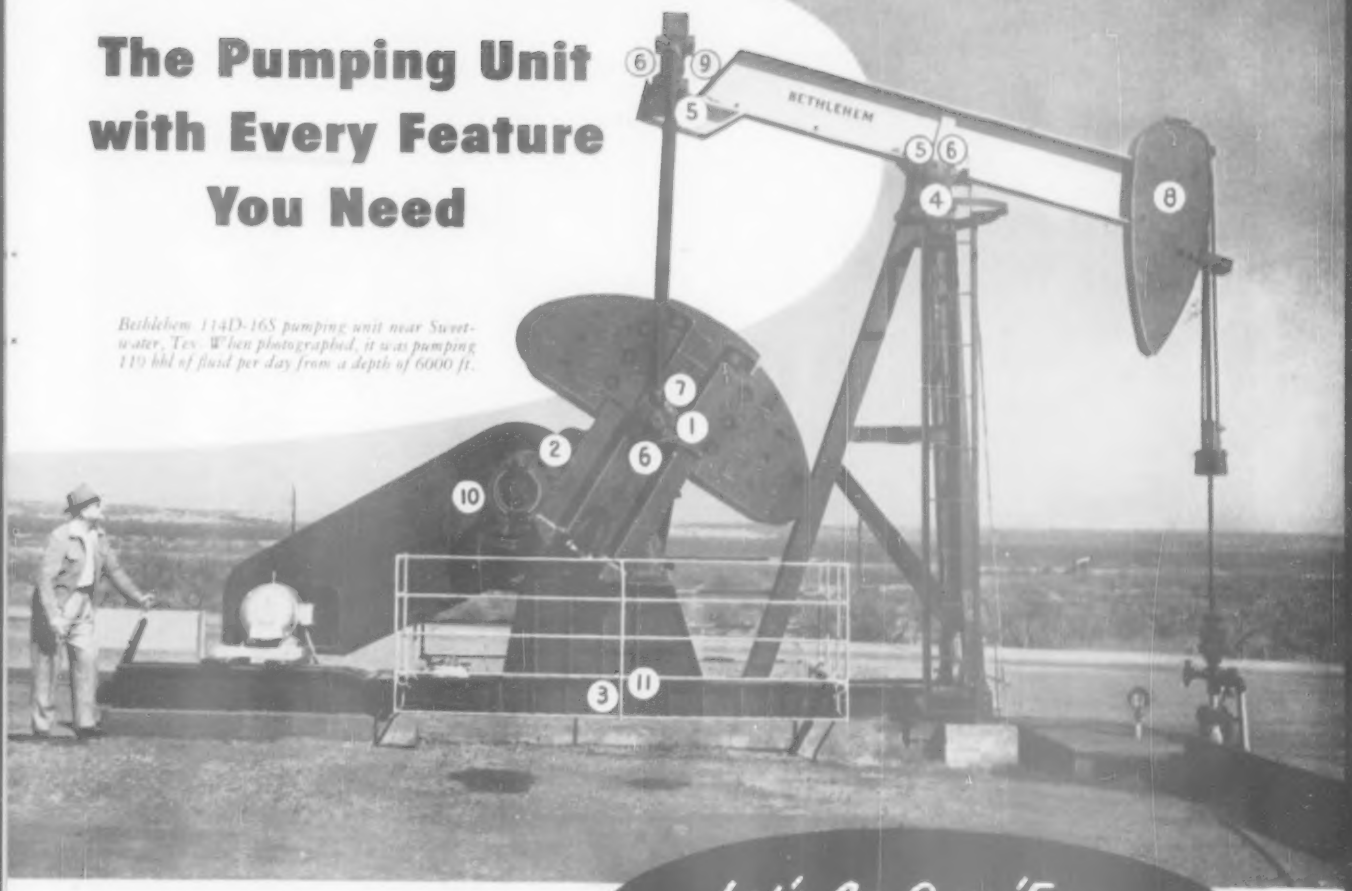
The basic parts of a roller bearing are the rollers, the races, and the *retainer* which locates and guides the rollers. There are significant differences in the design and construction of retainers, which influence bearing cost and performance. Some are simple and economical, well adapted for volume production; others are more costly but insure improved roller guidance, or cooler and smoother operation, or longer heavy-duty service. The seven basic types in current use are illustrated.

HYATT MAKES ALL SEVEN TYPES . . . EACH THE FINEST OF ITS KIND! You will find complete details in HYATT General Catalog No. 150, or your nearby HYATT Sales Engineer will gladly help you choose the type best suited to your requirements. Remember, HYATT is America's *first* and *foremost* maker of cylindrical roller bearings. Hyatt Bearings Division of General Motors, Harrison, N. J.

GM GENERAL MOTORS

HYATT ROLLER BEARINGS

The Pumping Unit with Every Feature You Need



Bethlehem 114D-16S pumping unit near Sweetwater, Tex. When photographed, it was pumping 110 bbl of fluid per day from a depth of 6000 ft.

Let's Go Over 'Em, Point by Point:

Frankly, we don't think you could name a desirable feature that's missing from Bethlehem pumping units. To see for yourself, you're invited to study them inch by inch, down to the last bolt and nut.

It will be pretty obvious that the units are beautifully engineered—even in small details. You'll note, for example, the *very* close tolerances in the gear box. And the jig-welding of structural components for uniform, accurate fit. And the sharp-shot-peened surfaces of structural parts—a feature that makes the weather-resistant paint adhere so long and so well.

Little things, sure! But indicative of Bethlehem quality, all the way through.

For major features, see the list at the right. Can you think of any competitive unit that has them *all?*

1 Fully adjustable rotary-type counterbalance with *safety lock.*

2 Full roller-bearing speed-reducer; flood lubrication of all gears and bearings in speed-reducer; forged-steel herringbone gears; rugged, strongly ribbed gear box with settling chamber.

3 Wide-flange reinforced base. Also available: complete range of prime-mover extension bases, and portable-base units with outrigger beams same size as main-base beams.

4 High Samson post for good mechanical advantage. Heavy, rugged walking beam.

5 Reservoir-lubricated saddle bearing and equalizer bearing; choice of centralized or ground lubrication system.

6 Relief valves at all pressure-lubricated points.

7 Keyed tapered wristpins; spherical, self-aligning wristpin bearings.

8 Completely removable horsehead.

9 Step-down equalizer, permitting equal loading in either direction of rotation.

10 Heavy-duty clamshell brake. Brake and pulley sides interchangeable.

11 Floor-clearing or non-floor-clearing models available.

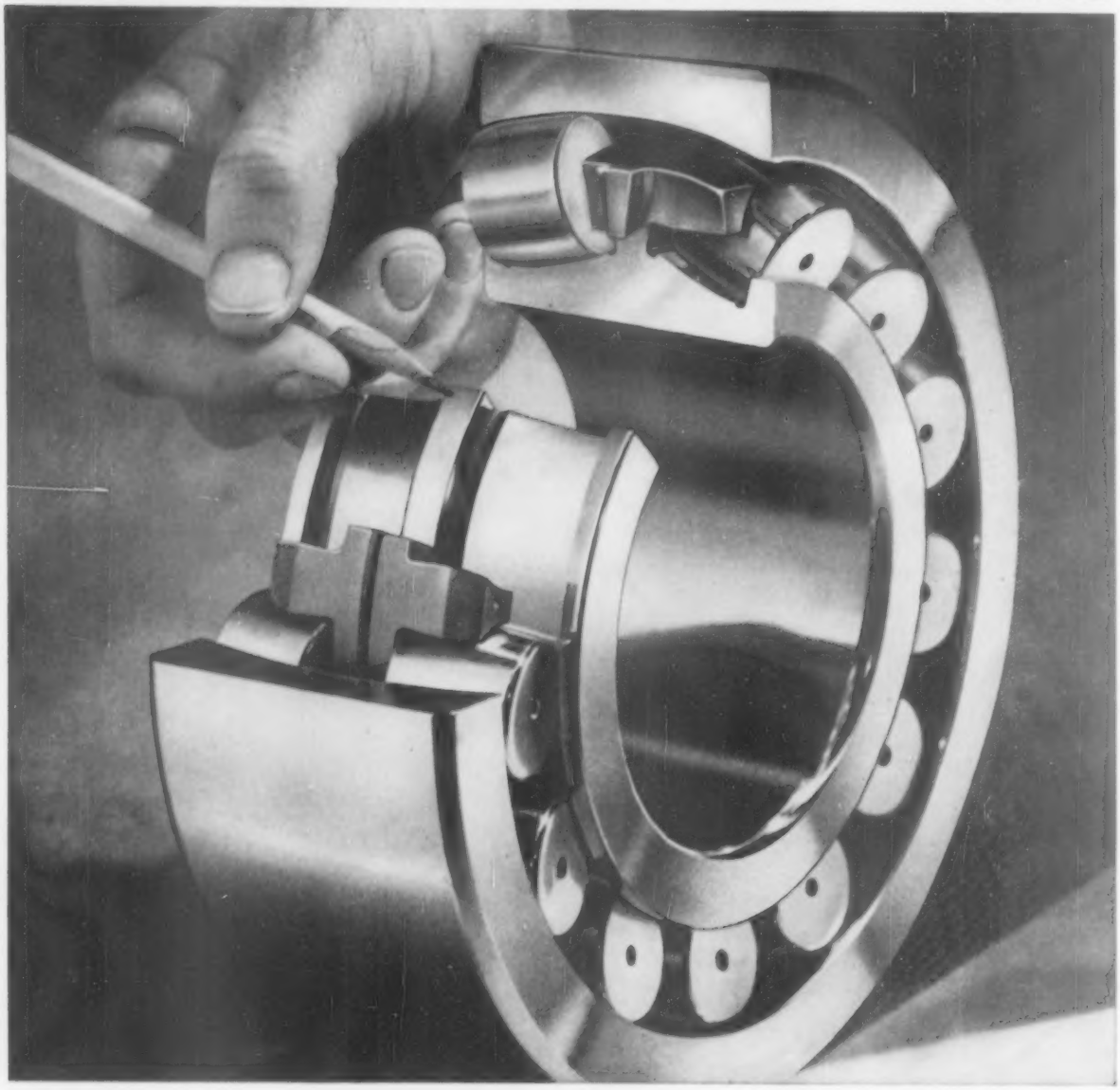
BETHLEHEM SUPPLY COMPANY

General Offices: 21 E. Second St., Tulsa, Okla.

West Coast Headquarters: Los Angeles, Calif. *Export Distributor:* Bethlehem Steel Export Corporation, 25 Broadway, New York, N. Y.

BETHLEHEM STEEL

TORRINGTON *SPHERICAL ROLLER* BEARINGS



"This flange guides the rollers to peak performance!"

The center flange on the inner raceway of the TORRINGTON Spherical Roller Bearing positions the rollers to handle thrust loads. This accurate positioning also assures radial stability of the rollers under heavy loads—even at continuous high speeds and under conditions of misalignment.

This superior design feature is only one of many advantages you get when you specify TORRINGTON. For example, you get the service of TORRINGTON'S experienced engineers, who will help you with design and maintenance problems—or design custom bearings for special applications.

For long, low-maintenance service in heavy-duty applications, order TORRINGTON Spherical Roller Bearings. They're available from stock with either straight or tapered bore, for shaft or adapter mounting.

THE TORRINGTON COMPANY
South Bend 21, Ind. • Torrington, Conn.
District offices and distributors in principal cities of United States and Canada

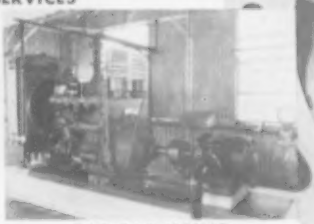
90th ANNIVERSARY 1865–1955

TORRINGTON BEARINGS

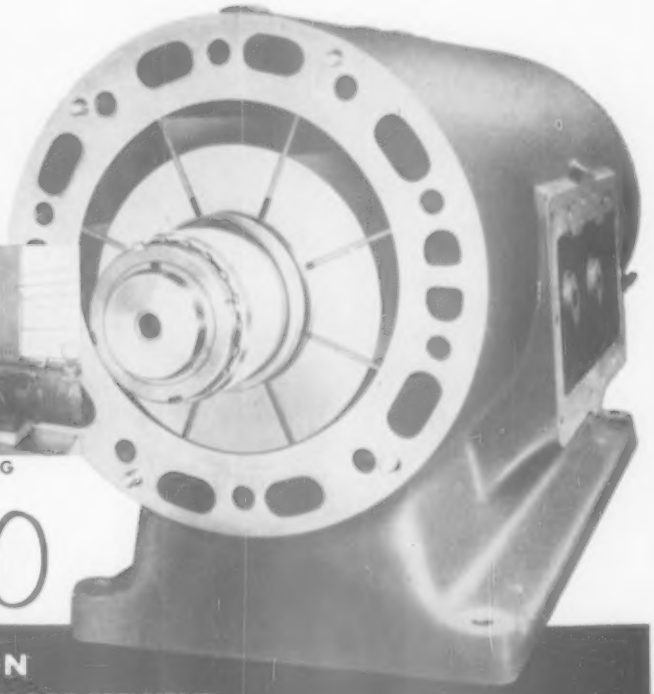
Spherical Roller • Tapered Roller • Cylindrical Roller
Needle • Ball • Needle Rollers

PLANT SERVICES

REFRIGERATION



GAS GATHERING



Since 1930

. . . FULLER ROTARY MOTION has been the key to SMOOTHER, MORE EFFICIENT, LOWER COST AIR COMPRESSION

The unique revolving principle pioneered by Fuller is the heart of the Fuller Rotary Compressor—both single- and two-stage types—and provides impressive cost, maintenance and operating advantages.

Simplified Fuller design consists essentially of a rotor eccentrically mounted in a cylinder to form a crescent divided into sections by the rotor blades. Each section or pocket carries air from one end of the crescent to the other without reversal of flow and with measurable improvement in volumetric efficiency. The rotor blades move freely by centrifugal force alone and compensate automatically for wear. As a result, Fuller Rotaries can operate indefinitely without care and the occasional inspection check required can be made with fewer men and in far less time.

COST-SAVING ADVANTAGES

1. Smooth, pulse-free, one-way air flow
2. Almost complete lack of vibration permits use of light foundation
3. Far fewer moving parts insure low maintenance
4. Small size for high capacity permits installation in minimum space
5. Direct drive further reduces space requirements
6. Valveless design permits continuous, unsupervised operation and greatly reduces maintenance

Fuller Rotary Compressors:

- Maintain original capacity for the life of the machine
- Provide a high degree of reliability, thereby reducing standby capacity requirements
- Have few moving parts, thus sharply reducing parts inventory
- Require minimum supervision and inspection

It will pay you to compare Fuller Rotaries with other compressors and evaluate Fuller advantages to your operation in terms of annual net savings. Fuller Rotaries are available for industrial pressures to 125 psig and capacities to 3300 cfm. We will be glad to supply you with facts based on actual experience with Fuller installations over the past 25 years.

Clip, fill in and mail the coupon for detailed information about Fuller Rotary Compressors for plant services, refrigeration or gas gathering.

FULLER COMPANY
132 Bridge St., Catasauqua, Pa.
A SUBSIDIARY OF GENERAL AMERICAN TRANSPORTATION CORP.
Chicago • San Francisco • Los Angeles • Seattle • Kansas City • Birmingham

FULLER COMPANY
132 Bridge St., Catasauqua, Pa.
Please send me, without obligation, descriptive literature on the Fuller Rotary Compressor. I am specifically interested in a pressure of _____psig and a capacity of _____cfm, to be used for:

NAME_____ ☐ Plant Services
TITLE_____ ☐ Refrigeration
CO. NAME_____ ☐ Gas Gathering
STREET ADDRESS_____
CITY_____ ZONE_____ STATE_____

Fuller
pioneers in harnessing AIR

C-29
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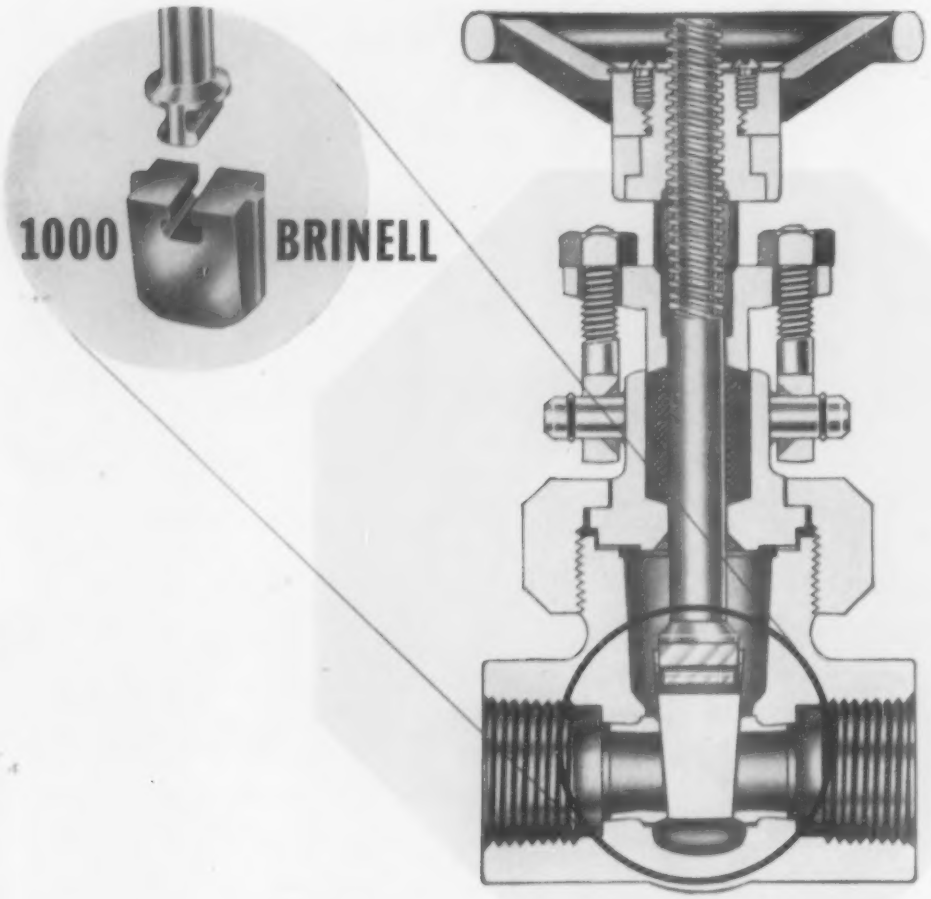


Fig. 1221

Stop Galling with the hardest valve wedges you can buy

OIC VALVES

FORGED & CAST STEEL,
BRONZE & IRON,
LUBRICATED PLUG VALVES

Highly resistant to erosion and corrosion

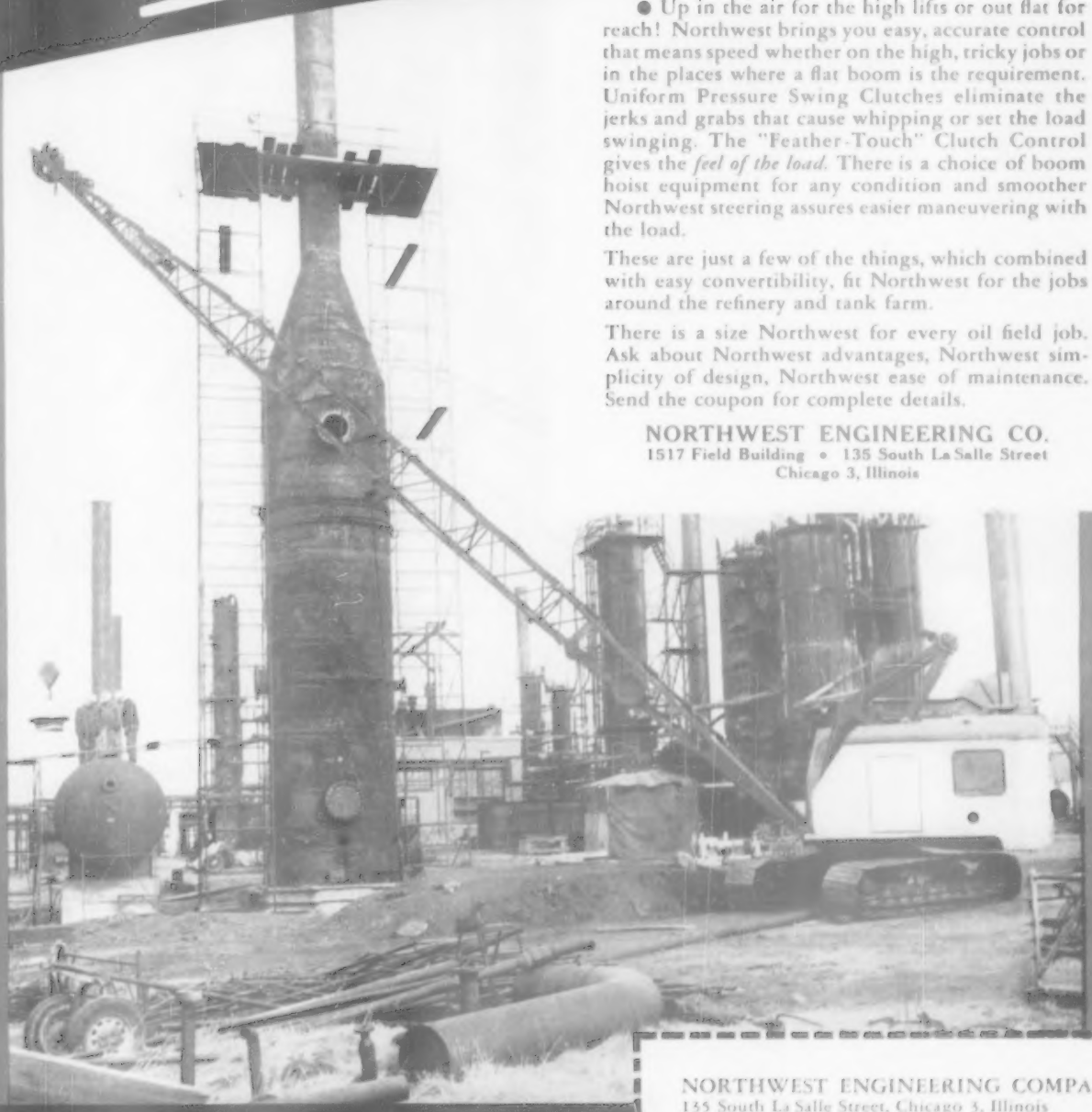
Here's a wedge as hard as flint . . . so hard that it's undamaged by pipe cuttings, scale or grit. It's the only trim we know of which will successfully withstand the simultaneous attack of the three valve-destroying agents—corrosion, erosion, galling. This wedge is *13% chrome stainless steel hardened up to 1000 Brinell.*

Specify the OIC 1221 gate or 1621 globe where you need the extra rugged nature of forged steel. They are recommended for steam service up to 800°F...oil service up to 1000°F. Or, use these same valves for hydraulic service up to 2000 lbs.

Write for Form 195 for specifications on the OIC forged steel line.

THE OHIO INJECTOR COMPANY
WADSWORTH, OHIO

A Good Crane is Good on any job!



● Up in the air for the high lifts or out flat for reach! Northwest brings you easy, accurate control that means speed whether on the high, tricky jobs or in the places where a flat boom is the requirement. Uniform Pressure Swing Clutches eliminate the jerks and grabs that cause whipping or set the load swinging. The "Feather-Touch" Clutch Control gives the *feel of the load.* There is a choice of boom hoist equipment for any condition and smoother Northwest steering assures easier maneuvering with the load.

These are just a few of the things, which combined with easy convertibility, fit Northwest for the jobs around the refinery and tank farm.

There is a size Northwest for every oil field job. Ask about Northwest advantages, Northwest simplicity of design, Northwest ease of maintenance. Send the coupon for complete details.

NORTHWEST ENGINEERING CO.
1517 Field Building • 135 South La Salle Street
Chicago 3, Illinois

NORTHWEST

CRAWLER and TRUCK MOUNTED SHOVELS • CRANES • DRAGLINES • PULLSHOVELS

NORTHWEST ENGINEERING COMPANY
135 South La Salle Street, Chicago 3, Illinois

Please send me complete information and catalogs on equipment as checked:

☐ Shovel ☐ Crane ☐ Dragline ☐ Pullshovel

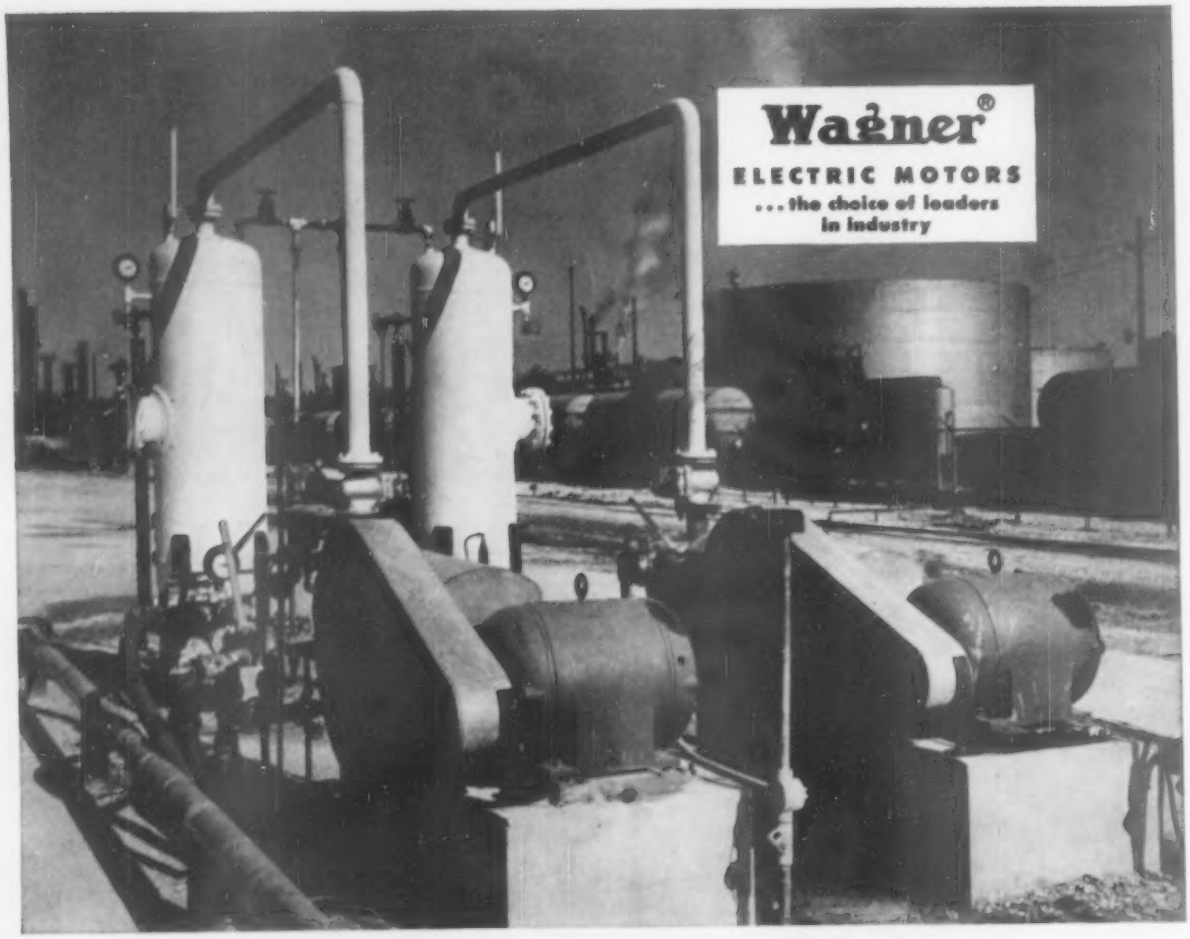
☐ Truck Crane Capacity _____

Name _____

Address _____

Town _____ Zone ____ State ____

Signed _____



Protected against explosion

WAGNER JP MOTORS

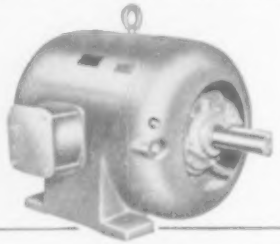
A single spark in a hazardous atmosphere can mean the end of refinery production . . . to say nothing of possible loss of life and millions of dollars in damage from fire and explosion.

Wagner Type JP Explosion-Proof Motors are expressly built for applications in hazardous atmospheres. They're perfect for the job . . . that's why they're the time-tested favorites of the petroleum industry—in pumping stations and in refineries. They are approved by Underwriters' Laboratories for Class I Group D hazardous locations. These motors are available in a complete range of ratings through 250 hp, normal torque and high torque.

In addition to these explosion-proof motors, Wagner also maufactures a line of drip-proof 40°C. polyphase motors, in ratings through 75 hp, especially designed for the continuous outdoor service demanded by oil well pumping applications. High power factor type capacitor oil well pumping motors are available for use where single-phase motors are required.

Write for Bulletin MU-132 on Cast Iron Frame Motors and for Bulletin MU-137 on Oil Well Pumping Motors. Thirty-two branch offices are ready to assist you in any motor application problem.

This Wagner Type JP Explosion-Proof, cast iron motor, with frames and endplates of cast iron, is suitable for indoor or outdoor use and for installations where corrosion is a problem . . . as well as for general applications.



Wagner Electric Corporation
6389 Plymouth Ave., St. Louis 14, Mo., U.S.A.

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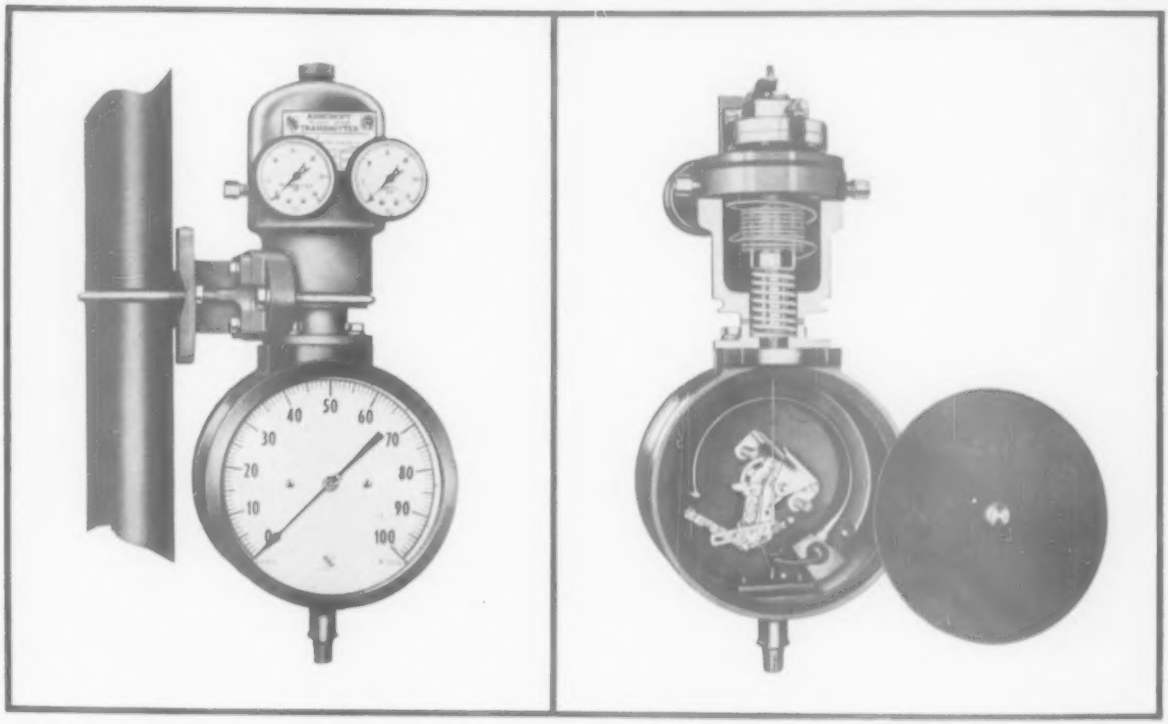
M56-3

ELECTRIC MOTORS • TRANSFORMERS • INDUSTRIAL BRAKES • AUTOMOTIVE BRAKE SYSTEMS–AIR AND HYDRAULIC

Designed to solve safety and service problems

...THE NEW ASHCROFT PNEUMATIC PRESSURE TRANSMITTER



This new Ashcroft Pneumatic Pressure Transmitter is particularly recommended to processing industries and power stations. It combines speed and accuracy with maximum protection and serviceability.

The new design features the 6" indicating Ashcroft Maxisafe Duragauge, long known for dependable performance. It has an integrally-cast solid metal wall between dial and pressure sensitive element so that the transmitter can measure pressures up to 100,000 psi with complete safety for personnel and equipment. If misapplication ruptures the Bourdon tube, the Teflon-coated back cover serves as a safety blowout relief.

Another outstanding design advantage is easy access to both gauge and transmitter sections. Simply remove the safety-relief back cover and both the gauge and transmitter can be calibrated. Yet a sealed housing makes the entire assembly weatherproof.

The transmitter operates on low-pressure air. No need for expensive high-pressure lines and fittings. Supply air pressure as low as 18-20 psi for 3 to 15 psi output provides especially advantageous operation where electrical wiring might be a hazard. Inflammable, poisonous or corrosive liquids or gases are confined close to their source, away from the central control point.

The Series 1250 Ashcroft Pneumatic Pressure Transmitter is available with pressure sensing elements in all standard pressure ranges and Bourdon tube materials. Installation of the transmitter is easy. Small diameter tubing may be used, and the pipe, stem, wall or flush mounts are interchangeable in the field. Get complete operational data and construction details. Write for Bulletin 340.

YOUR INDUSTRIAL SUPPLY DISTRIBUTOR has the broad knowledge and thorough experience essential to satisfy every requirement of your Ashcroft Pneumatic Pressure Transmitter application. You get fast, economical service from his local stocks.

In Canada: *Manning, Maxwell & Moore of Canada, Ltd., Galt, Ontario*

ASHCROFT GAUGES

A product of **MANNING, MAXWELL & MOORE, INC.** STRATFORD, CONNECTICUT

MAKERS OF 'AMERICAN' INDUSTRIAL INSTRUMENTS, 'CONSOLIDATED' SAFETY AND RELIEF VALVES, 'AMERICAN-MICROSEN' INDUSTRIAL ELECTRONIC INSTRUMENTS, *Stratford, Conn.* 'HANCOCK' VALVES, *Watertown, Mass.* 'CONSOLIDATED' SAFETY RELIEF VALVES, *Tulsa, Oklahoma.* AIRCRAFT CONTROL PRODUCTS, *Danbury & Stratford, Conn. and Inglewood, Calif.* "SHAW-BOX" AND 'LOAD LIFTER' CRANES, 'BUDGIT' AND 'LOAD LIFTER' HOISTS AND OTHER LIFTING SPECIALTIES, *Muskegon, Mich.*

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. . . for oil men the world over who rely on Mid-Continent Supply Co. for Sure Service, Sure Supply

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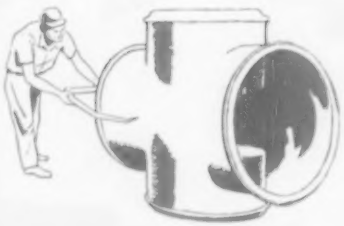
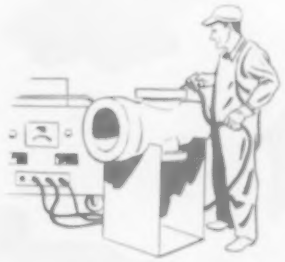
THE WORLD'S LARGEST INDEPENDENT OIL FIELD SUPPLY COMPANY





W-K-M Valves

JUST LIKE INSURANCE

W-K-M's precise control of each step of the manufacturing process insures the excellence of every W-K-M Valve. Depending upon the size and the type of the valve, there will be over 300 separate inspections made on every single valve produced in the W-K-M plant. This is your assurance that W-K-M Valves will not only meet your most rigid specifications, but will provide trouble-free service for years to come.

Receiving Inspection

Raw Castings and materials received in warehouse are inspected for conformity to dimensional specifications.

Chemical & Metallurgical Analysis

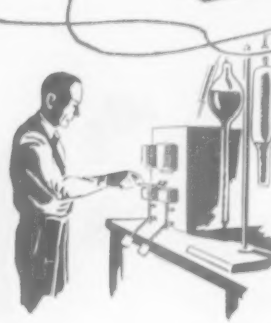
Chemical and physical tests are run to determine conformity to ASTM specifications. In the case of some high pressure valves, the castings are inspected by gamma ray technique. Many other castings and materials are checked by magnetic particle methods to assure soundness of structure.

Manufacturing Inspection

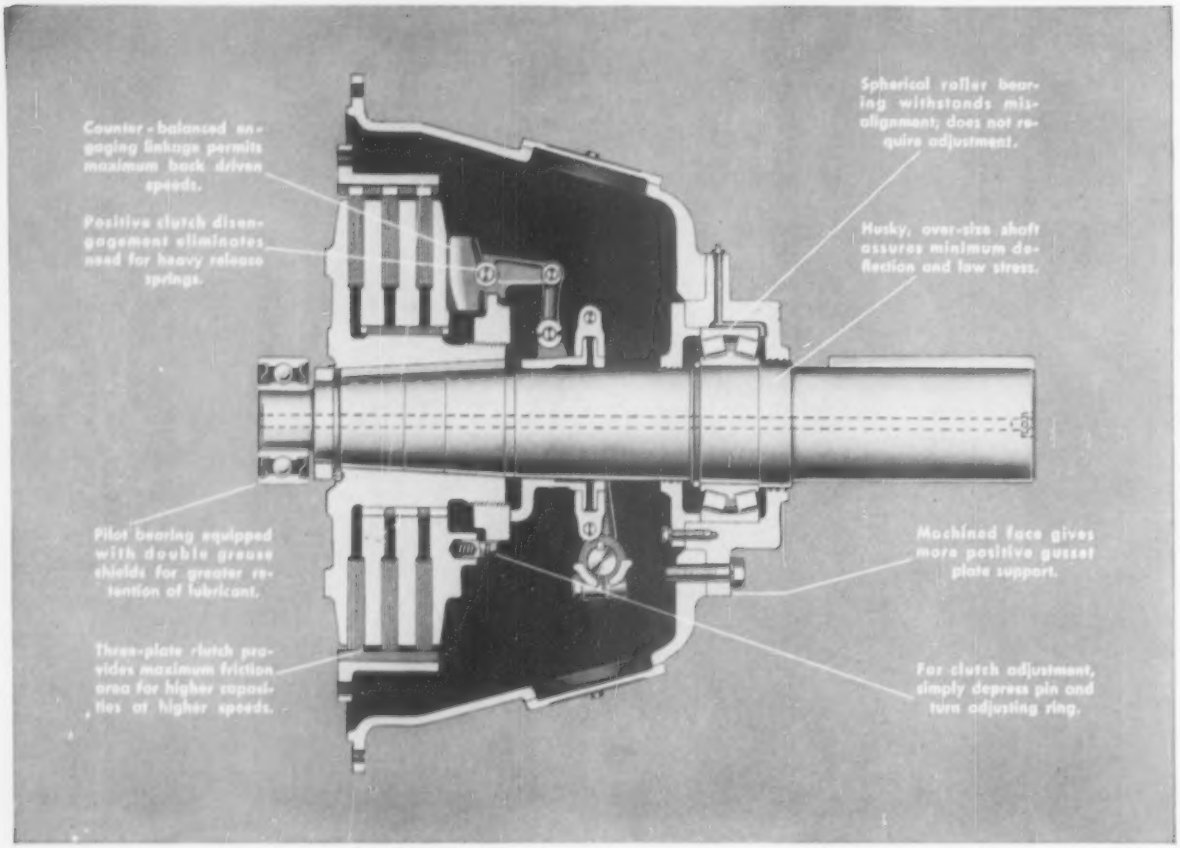
All manufactured parts inspected for dimensional accuracy and finish. Also metallurgical and physical testing procedures are applied to maintain rigid control of these parts.

Testing

All valves tested 100% on high pressure test rack to test soundness of body and sealing at both seats.



W-K-M Manufacturing Company, Inc.
A subsidiary of ACF Industries
P. O. Box 2317, Houston 1, Texas Los Angeles, California
Export Office: 45 Rockefeller Plaza, New York, N. Y.


Counter-balanced engaging linkage permits maximum back driven speeds.
Positive clutch disengagement eliminates need for heavy release springs.
Spherical roller bearing withstands misalignment; does not require adjustment.
Husky, over-size shaft assures minimum deflection and low stress.
Pilot bearing equipped with double grease shields for greater retention of lubricant.
Three-plate clutch provides maximum friction area for higher capacities at higher speeds.
Machined face gives more positive gusset plate support.
For clutch adjustment, simply depress pin and turn adjusting ring.

A new Power Take-Off for higher-speed, higher-horsepower engines

Here is the all-new Twin Disc Model SP-318 heavy-duty Friction Power Take-Off—designed and engineered especially to meet the extra requirements of the new engines in the 350 to 375 hp range, operating up to 1800 rpm.

Extremely compact for its capacity, the new Twin Disc Power Take-Off is provided with an S.A.E. #0 flywheel housing. With triple driving plate construction, it assures ample friction surfaces to withstand high horsepower loads. And with solid driving plates, the new PTO effectively permits higher safe permissible speeds.

The pilot bearing of the new Power Take-Off is composed of a single row of balls, operating in bearing races of double-row width . . . providing improved accommodation of minor misalignment inherent in installations of this nature. Pilot bearings of this type provide additional space for lubricant, which is more effectively retained by the double grease shield construction. Although this construction is usually referred to as "sealed for life," the clutch shaft is drilled to provide for relubrication of the pilot bearing in the usual manner.

Another outstanding feature of the new Twin Disc Power Take-Off is the use of a spherical bearing which does not require adjustment. With its inherent ability to permit angularity, the spherical bearing is more resistant to overload and destructive forces resulting from heavy side loads.

For complete information on the new Twin Disc SP-318 Friction Power Take-Off (and the SP-314, a smaller model of the same new design, for engines in the 225 hp range operating at 2200 rpm), write to the Twin Disc Clutch Company, Racine, Wisconsin.

TWIN DISC

TWIN DISC

Friction Clutches and Fluid Drives

TWIN DISC CLUTCH COMPANY, Racine, Wisconsin
Hydraulic Division, Rockford, Illinois

This is Why the Nash is the Most Simple Compressor

It's the Nash!

There are no mechanical complications in a Nash Compressor. A single moving element, a round rotor, with shrouded blades, forming a series of buckets, revolves freely in an elliptical casing containing any low viscosity liquid. This liquid, carried with the rotor, follows the elliptical contour of the casing.

The moving liquid therefore recedes from the rotor buckets at the wide part of the ellipse, permitting the buckets to fill with gas from the stationary Inlet Ports. As the casing narrows, the liquid is forced back into the rotor buckets, compressing the gas, and delivering it through the fixed Outlet Ports.

Nash Compressors produce 75 lbs pressure in a single stage, with capacities to 6 million cu. ft. per day in a single structure. Since compression is secured by an entirely different principle, gas pumping problems difficult with ordinary pumps are often handled easily in a Nash.

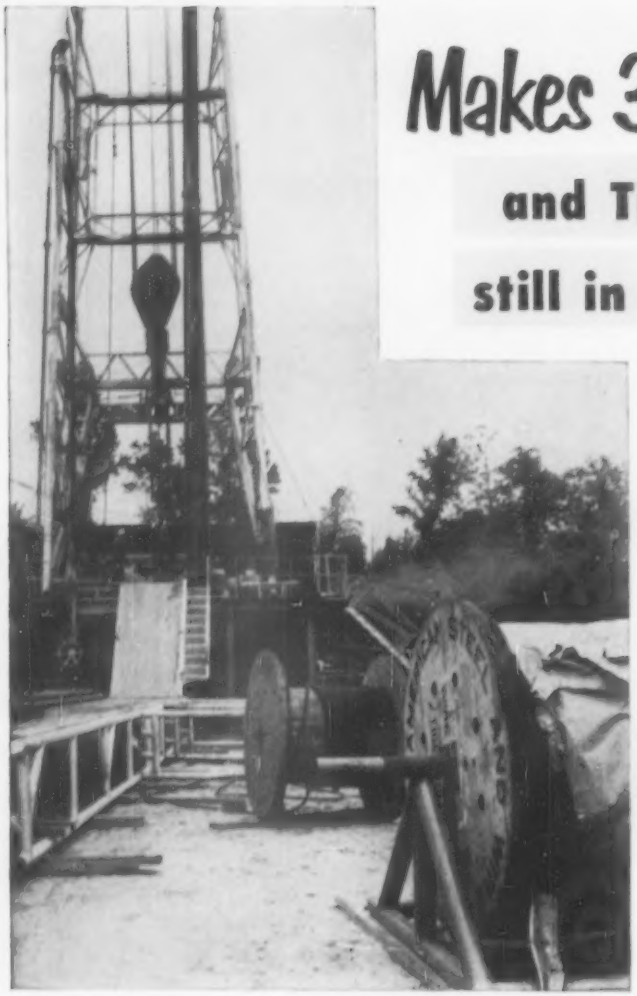
Nash simplicity means low maintenance cost, with original pump performance constant over long periods. Data on these pumps sent immediately on request

- No internal wearing parts.
- No valves, pistons, or vanes.
- No internal lubrication.
- Low maintenance cost.
- Saves floor space.
- Desired delivery temperature automatically maintained.
- Slugs of liquid entering pump will do no harm.
- 75 pounds in a single stage.

NASH ENGINEERING COMPANY
313 WILSON, SO. NORWALK, CONN.

Makes 37,500 ft. of hole

and Tiger Brand Line is still in excellent condition



"It was a lucky day we switched to Tiger Brand Rope," says Jack White, Tool Pusher. "We hit oil on all three wells drilled with this rope."

Tri-State Drilling Co's Rig No. 2 going through a hard strata of limestone near Soso, Mississippi.

Jack R. White, Tool Pusher for the Tri-State Drilling Company near Soso, Mississippi, says, "We've drilled three wells with this Tiger Brand line and we struck oil in all three at a depth of about 12,500 feet. The line is still in *excellent* condition and good for a lot more work.

"We get such good service because we follow the recommendations carefully and 'cut in' the rope at regular intervals, so that the actual points of wear are constantly being moved. What's more, this rig has a new style grooved drum which goes a long way toward prolonging the life of any wire rope."

Tiger Brand Wire Lines come in many types to suit every drilling need. In addition to Rotary and Cable Tool Drilling Lines, there are Sand Lines, Torpedo Lines, Winch Lines, Hoisting Rope and Steel Guy Strand. Next time you buy line, get the kind that saves you money—Tiger Brand. Your nearby distributor has *just the line you need.*

SEE THE UNITED STATES STEEL HOUR. It's a full-hour TV program presented every other week by United States Steel. Consult your local newspaper for time and station.

The Right Wire Rope will do the trick!

AMERICAN STEEL & WIRE DIVISION, UNITED STATES STEEL, GENERAL OFFICES: CLEVELAND, OHIO
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UNITED STATES STEEL EXPORT COMPANY, NEW YORK

USS AMERICAN TIGER BRAND WIRE ROPE

Excellay Preformed

USS

UNITED STATES STEEL

You're covered across the board

when you use
General Controls' line of quality automatic controls

More and more designers find one simple rule short-cuts their control problems with a quick solution: "Check General Controls first!" For the chances are the complete GC line has the perfect answer to your problems whether it's a time switch or thermostat, a midget solenoid or mighty hydramotor. Get acquainted with the branch office (one of 38) nearest you . . . one source—one responsibility—near at hand—at your service.

K-21 MAGNETIC STOP VALVE

Packless—2 way—normally closed. For air, gas, steam, water, oil, corrosive fluids. Pressures to 300 psi. Forged brass body. Stainless steel or soft seat.

K-27 MAGNETIC VALVE

Stainless steel for high sulphur fuels, syrups, juices, acids, alkalis, etc. Pressures to 300 psi. Midget size. Multi poised—operates in any position.

K-10 MAGNETIC VALVE

Lever action for higher seating pressure. Excellent general purpose valve for primary fuel, feed water, steam, air. (300 psi max. operating pressure differential.)

K-15 MAGNETIC VALVE

Piloted piston design. Large flow capacity with low pressure drop. For air, gas, steam, oil derivatives. Versatile—with 3 coil classes, 5 seat variations.

K-123 MAGNETIC VALVE

3 way—for normally open or normally closed directional control and mixer applications—on pneumatic or hydraulic operated devices, machine tools, etc.

K-273 MAGNETIC VALVE

3 way flow or mixer type. Compact, multi poised. For air, water, hydraulic fluids—charging or emptying systems. Normally open or closed. Choice of flow patterns.

TIME SWITCHES

Wide selection for domestic and commercial use—spring wound or motor driven, normally open or closed. For ventilating, lighting, refrigeration, etc.

HYDRAMOTORS

Wide range of types in complete range of pipe sizes and body styles to provide safe, dependable, durable answer to all liquid transfer problems.

AIR MOTOR VALVES

Air-operated diaphragm valve for modulating control. Normally open or closed, 3 way, or slide gates. Selection of various inner valves, body sizes and connections.

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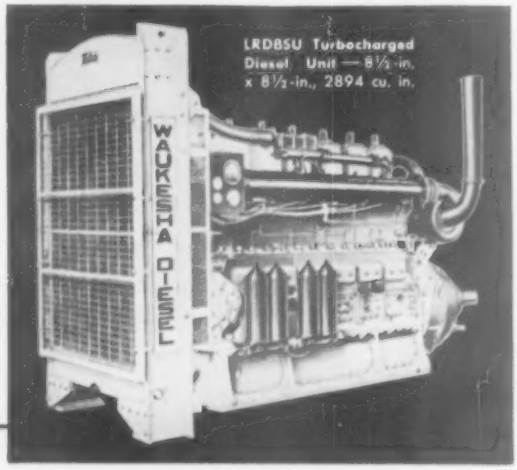
drilling with NEW EMSCO A-800 rig...

powered by three

WAUKESHA Diesels

At Pincher Creek, Alberta, Canada, Brinkerhoff Drilling Co. Ltd. are drilling with the new Emsco A-800, a medium-deep rig of "packaged portability" design. Its three Waukesha LRDBSU Turbocharged Diesel Units used here, add greater power at lowest fuel cost. ● Main drum has 6 forward, 2 reverse speeds; rotary has 3 forward, 1 reverse. No. 1 engine may be compounded with No. 2 engine and No. 3 engine. Pumps may be driven simultaneously at different speeds or any engine combination may drive either pump. Each LRDBSU Waukesha has 420 continuous duty hp at 1200 rpm. With its vibration-dampened counterbalanced crankshaft having seven 5½" main bearings, this big turbocharged Diesel has many outstanding characteristics including lively acceleration, clean burning, prompt starting, a tremendous reserve of power and great overall economy. Send for Bulletin 1606.



291-R

WAUKESHA MOTOR COMPANY • WAUKESHA, WIS.

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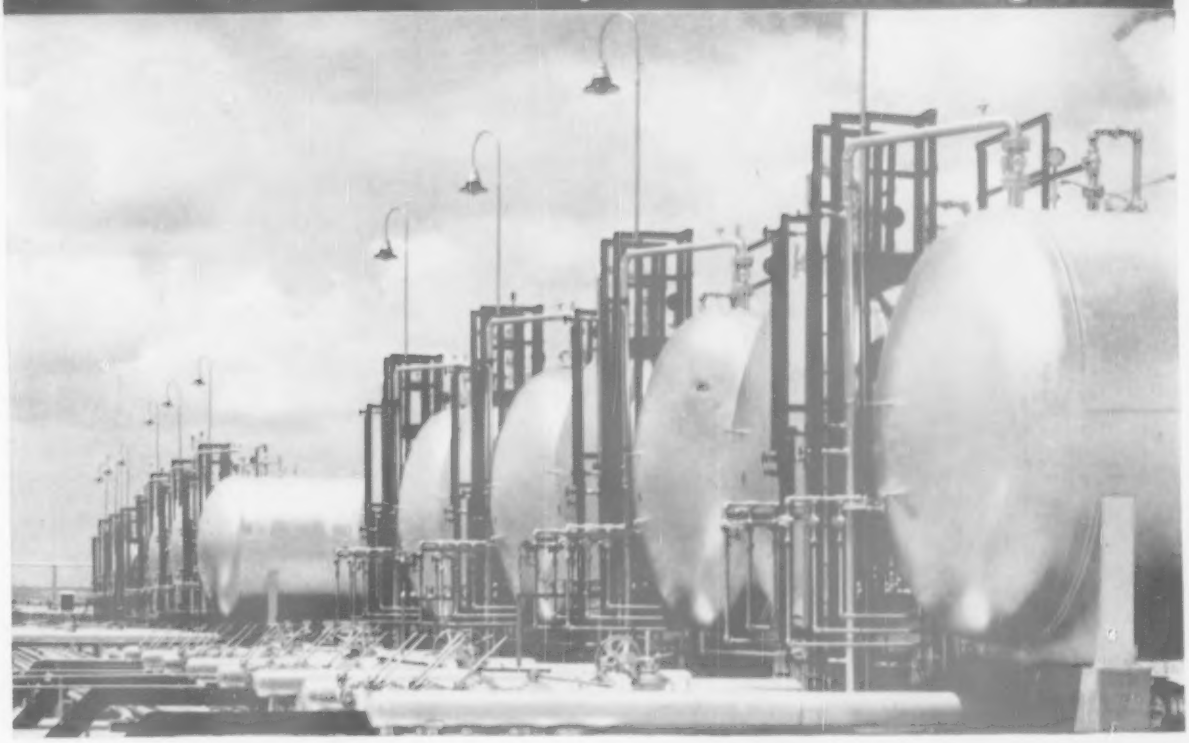
Look For More Penberthy Installations During '56



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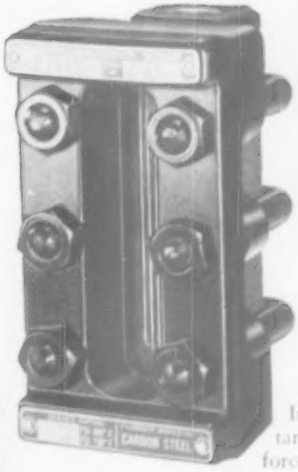
Liquid Level GAGES *and* Gage Valves *by* PENBERTHY



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REFLEX liquid level gages.
TRANSPARENT water and liquid level gages.
TRANSPARENT High Pressure liquid level gages.

Frost-free Gages, Heating Tube and Heating Chamber Gages, Welding Pad Gages, Large Chamber Gages, Inclined Gages and Explosion-proof Illuminators.

PENBERTHY GAGE VALVES

...with exclusive Floating Shank

Tubular and Threaded gage valves • Jacketed Gage Valves • Instrument Valves • Wire glass protectors, plate glass protectors, sheet metal guard protectors.

• The Penberthy line is designed specifically for petroleum industry service. They are rugged and reliable . . . engineered with exclusive features to save you time and money.

Savings of 50% and more on installation costs alone are credited to the "floating shank" of Penberthy Gage Valves. It compensates for variations in center-to-center distances of tank tappings or gage assemblies . . . eliminates strains of forced installations.

Cleaning or replacement of gage glass is facilitated by the "Raised Face", standard only on Penberthy Gages. Perfect alignment of frame with glass and gasket is assured also.

Feature for feature, Penberthy offers you the best value for your dollar. Compare the line shown in Catalog 35 with any other. We'll be glad to send you this catalog on request. Also sold through supply stores in most fields.

PENBERTHY INJECTOR COMPANY

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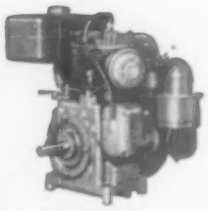
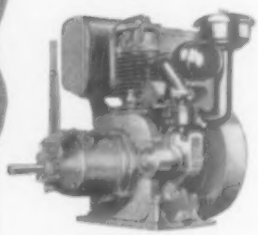
Performance-Proved Field-Tested POWER...

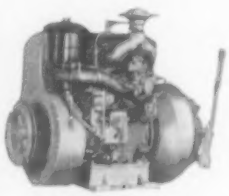
WISCONSIN HEAVY-DUTY Air-Cooled ENGINES



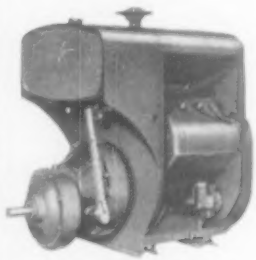
Models ACN, BKN,
4-cycle
Single Cylinder
2.3 to 6.8 hp.



Models AEN, AFH, AGH, AHH — 4-cycle
Single Cylinder
6 to 9 hp.



Model TFPD Oil Well Pumping Engine
8.3 to 13.2 hp.



Models VE4, VF4, VG4D
V-type, 4-cylinder
15 to 36 hp.

The fact that Wisconsin Air-Cooled Engines have been given such wide-spread and enthusiastic acceptance in the Oil Field is due to several good, solid factors:

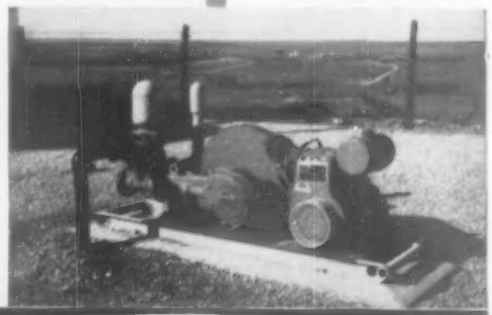
1 Field-Tested. Wisconsin-powered equipment is being tested constantly under actual operating conditions by the field staff of Harley Sales Company. Accurate service records determine the advantages and limitations of the units on test, thereby providing the customer with ultraconservative performance claims. The customer knows, in advance of purchase, what to expect . . . and usually his best expectations are more than fulfilled.

2 Performance-Proved. Thousands of Wisconsin Heavy-Duty Air-Cooled Engines, ranging from the power-packed little ACN and BKN models to the husky VG4D V-type, 4-cylinder job, turning up 36 hp. at 2200 R.P.M., are delivering hard-hitting, dependable power every day, under all conceivable operating conditions. "Most H.P. Hours" of performance-proved service provides tangible evidence of Wisconsin Engine stamina and economy.

3 Sellers' Service. As primary oil field distributors, the Harley Sales Company has full recognition of the need for prompt delivery of equipment and parts and maintains exceptionally large warehouse stocks. Orders for parts are handled the same day they are received.

4 Manufacturer's Responsibility. As the world's largest builders of heavy-duty air-cooled engines, the Wisconsin Motor Corporation has a responsibility both to the *seller* and *user* that is fully met and sustained to the limit of our ability.

All this adds up to the kind of a deal that pays off for the power user in terms that are most satisfactory to him.



Wisconsin-Powered Oil Well Pumping Unit... Single cylinder Wisconsin Engine operating a Goulds' Reciprocating Pump in Oklahoma Little Chief field.

WISCONSIN MOTOR Corporation
MILWAUKEE 46, WISCONSIN
World's Largest Builders of Heavy-Duty Air-Cooled Engines

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7354

① **AUSTIN-WESTERN HYDRAULIC CRANE**
In addition to power steering, Vickers Oil Hydraulics provide fast, smooth and positive (a) turntable rotation, (b) boom elevation, (c) raising and lowering of load, (d) extending and retracting of boom.

② **BAKER-RAULANG TRAVELOADER**
Vickers Hydraulics provides power steering and multiple movements that enable Traveloader to quickly reach out sideways and pick up a long load, place it on the vehicle's deck for traveling, and then stack it up to 12' high.

③ **DART UNDERGROUND TRUCK**
Vickers Hydraulics operates the reversible conveyor floor that permits fast and easy trim when loading, and then rapid dumping. Also has Vickers Hydraulic power steering for shuttle operation.

Ciment Fondu is a high quality high-alumina cement and its manufacturers, Lafarge Aluminous Cement Co. Ltd. are by far the largest individual producers in the World. The name of Lafarge has been associated with the manufacture of lime and cements for 125 years and Ciment Fondu is to-day in continuous use throughout industry on all five continents. This proud record is maintained through a combination of long experience, manufacturing know-how and a determination to remain acknowledged as producers of The Best Cement in the World.

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No other type of cement combines all these advantages. High-Alumina is stronger —hardens more rapidly. For many purposes concrete can safely be put into use within a few hours of placing and is ready for any purpose in 24 hours. High-Alumina is completely immune from attack by sulphates and highly resistant to sulphuric acids. High-Alumina produces Refractory Concrete stable to 2500°F., Non-spalling; Non-shrinking.

CIMENT FONDU is available throughout the World in any standard bag or steel drum.

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Lining overhead receivers at stabilisers
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Bahrein Petroleum Co. Ltd., Bahrein.
Basrah Petroleum Co. Ltd., Basrah, Iraq.
Berry Wiggins & Co. Ltd., Kingsnorth Refinery.
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B.P. Benzin-und Petroleum - G.m.b.H. Refinery, Hamburg.
Caltex Petroleum Maatschappij, Rotterdam.
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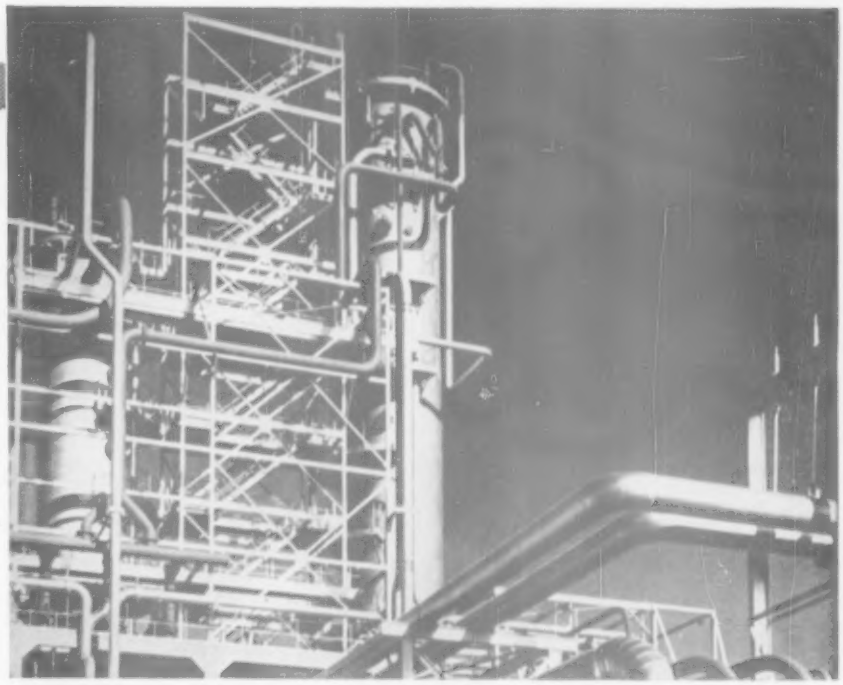
Compania Shell de Venezuela Ltd., Cardon Refinery.
Consolidated Oil Refineries Ltd., Haifa.
Diadema Argentine S.A. de Petroleo, Buenos Aires.



for the OIL INDUSTRY

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N.V. Nederlandsche Nieuw Guinee Petroleum Mij, Sorong.
N.V. de Bataafsche Petroleum Maatshappij, Pernis Refinery.
Sarawak Oilfields Ltd., Labuan, Borneo.
Shell Co. of Australia Ltd., Geelong Refinery.
"Shell" Refining and Marketing Co. Ltd., Shellhaven.
"Shell" Refining and Marketing Co. Ltd., Stanlow.
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A "Shell" Photograph

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In DYNALOG Instruments, a simple, variable, radio-type capacitor replaces the troublesome slidewire — gives unmatched smoothness of balancing.

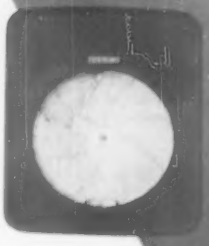
This potentiometer has no slidewire

STEPLESS CAPACITY-BALANCING

ELIMINATES SLIDEWIRE MAINTENANCE

DYNALOG'S* EXCLUSIVE BALANCING ACTION

- no slidewire
- no batteries.
- no standardizing
- no gears, cables, etc.
- no high-speed reversing motor



There's no need to put up with worn slidewires and sticking electrical contacts . . . no need to periodically clean and lubricate balancing motors. DYNALOG design eliminates all this! Its simple variable capacitor and positive magnetic drive provide *continuous, stepless* balancing . . . *never* require attention!

DYNALOG's friction-free action provides high speed of response without wear. (There are only five moving parts, including the recording pen!) Sensitivity, unlimited by turns of slidewire winding, is 1/100 of 1%. And accuracy is a sustained 1/4 of 1%.

DYNALOG Instruments are available for use with resistance, voltage, capacity, or inductive type primary elements to measure and/or control any process variable . . . with unmatched smoothness. Write for Bulletin 427. The Foxboro Company, 601 Neponset Ave., Foxboro, Mass., U.S.A.

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DYNALOG

ELECTRONIC INSTRUMENTS

They Say—

Fabulous Kuwait

"Production in Kuwait is now obtained from three fields: the Burgan field, where oil was first discovered in 1938; the Magwa field, discovered in 1951; and the Ahmadi Ridge field, which was discovered in 1952.

"The Burgan field is regarded by many as perhaps the most prolific oil field in the world. The producing section is comprised of three major sands, lying at the relatively shallow depths of 3,300 to 4,800 ft. and with total pay thicknesses ranging up to over 1,000 ft.

"Individual well capacities range from 1,000 bbl. daily for wells completed in the uppermost sand to 12,000 bbl. daily for those completed in the thicker and more permeable third and fourth sands. The average oil gravity of the field is about 31°. The general reservoir characteristics at Magwa and Ahmadi are similar to those of the Burgan field.

"Some exploratory work has been done in other parts of Kuwait, including the northern part near the Zubair fields of Iraq which are productive only a short distance to the north. Tests are currently under way to evaluate the various productive sands which have been encountered in a recent Kuwait well drilled in this area."

S. A. Swensrud, chairman of board Gulf Oil Corp. in address before New York Society of Security Analysts.

All in Same Boat

"Unless the Harris-Fulbright bill becomes law, your industry will have to whittle down some of its hopeful plans for the future. For if this legislation fails of enactment, the heyday of interstate natural-gas pipeline construction will be a matter of past history.

"Lest there be anyone in this room who thinks that it (federal control) is just a natural-gas producer's headache, let me remind him of this: Unless the present situation is promptly altered, it will also be a pipeline contractor's headache.

"Advocates of federal controls would tell you not to worry, but if I were a pipeline contractor, I would worry.

"Advocates of federal controls will tell you the producers have got to sell their gas, and that's true. But they don't have to sell it all in interstate commerce . . . They may be driven by meddlesome federal controls and bureaucratic harrassment, by the in-

Another New
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TAPPING MACHINE
EASY ACTION CLUTCH*
AUTOMATIC CUTTING FEED
HEAVY DUTY BEARINGS
HAND POWERED OR WITH AIR MOTOR DRIVE
MODEL
360
PIPELINES • CHEMICAL PLANTS
REFINERIES • STEEL MILLS
For making high pressure, high temperature taps into piping and tanks WITHOUT SHUTDOWN
• 24" BORING BAR TRAVEL PERMITS
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MAXIMUM OPERATING PRESSURE
1,440 PSI AT 100 F
MAXIMUM TEMPERATURE
700 AT 700 PSI
EACH MACHINE TESTED TO: 2,175 PSI
SELF ADJUSTED CHEVRON PACKING*
INTEGRAL FLANGE FORGING*
ASA 600 RTJ FLANGE
CHROME PLATED BORING BAR
*NEW FEATURES FOUND ONLY IN 360 MACHINE WHICH SUPERSEDES MODEL 300
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FOR ANY HEAT-TRANSFER APPLICATION

the Buy-Word's CAL-FIN TUBING

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They recently left D-H factory! An order specifying Cal-Fin Tubing—*72' 8¾" long!*

They were incorporated into a process dryer for one of world's leading chemical concerns.

UNUSUAL! But, not the "long-haul" performance of Cal-Fin Tubing—ordered, and repeat-ordered—in any dimension—by the Chemical, Oil and other basic Industries for exclusive cost-cutting advantages: serrated fins electrically-welded and helically wound: more efficient heating surface per foot of length; selection of tubing to meet a wide variance of temperatures.

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tolerable burdens of an unworkable law, to seek ways of expanding their sales at home in preference to regulated sales in interstate commerce. Such a decision would be aided by the fact that versatile natural gas has many uses."

Frank M. Porter, president American Petroleum Institute, in address to Pipe Line Contractors' Association, Boca Raton, Fla.

Atomic Payoff Slow

"It may be 15 to 20 years before pioneer industrialists in the atomic power field get any significant return from enormous investments.

"Many of these pioneers may get no more out of their initial investment and trail-blazing work than the patents for the inventions they contrive."

Casper W. Ooms, Chicago, former U. S. Commissioner of Patents and member of Atomic Energy Commission patent advisory board, in address to Nuclear Science and Engineering Congress, Cleveland.

It's Big Business Now

"During the postwar period, the yearly volume of business at service stations in terms of gasoline gallonage throughput, tires, batteries, and accessory sales, service sales, and in total dollar volume, has almost doubled.

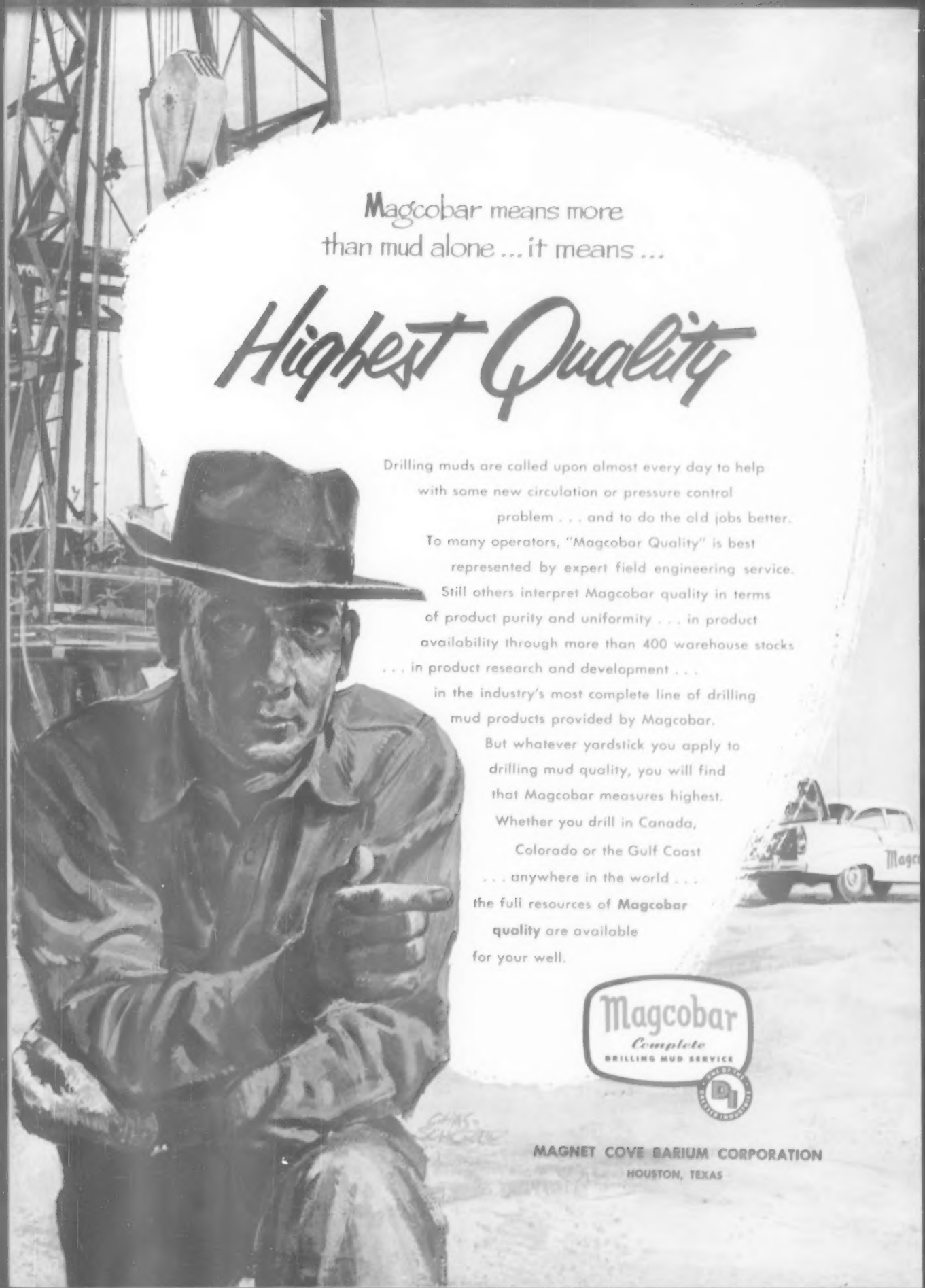
"It is a well-accepted management principle that the larger the operating or selling unit, the greater the need for competent management, for training, in order to assure the successful operation of that unit. This, I believe, is the crux of the need for distributive education, starting at high-school level, for service-station dealers of the future.

"The service-station business is going through a 'growing-up process' and naturally, it has suffered some growing pains. But it is reaching maturity and today we sincerely believe offers a young man an unexcelled opportunity to establish himself in his own business, in a business that offers stimulation, independence and income, consistent with investment, effort and ability."

E. J. Langham, mercandising manager, Sun Oil Co., in address to national convention of the American Vocational Association, Atlantic City, N. J.

Profits Must Increase

"To support Phillips growing investment in new plants and expansion of properties of all types, the company must continue to earn larger profits. The key to higher profits will always be raising sales income and cutting costs. Therefore, increasing sales in-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Highest Quality
Drilling muds are called upon almost every day to help with some new circulation or pressure control problem . . . and to do the old jobs better.
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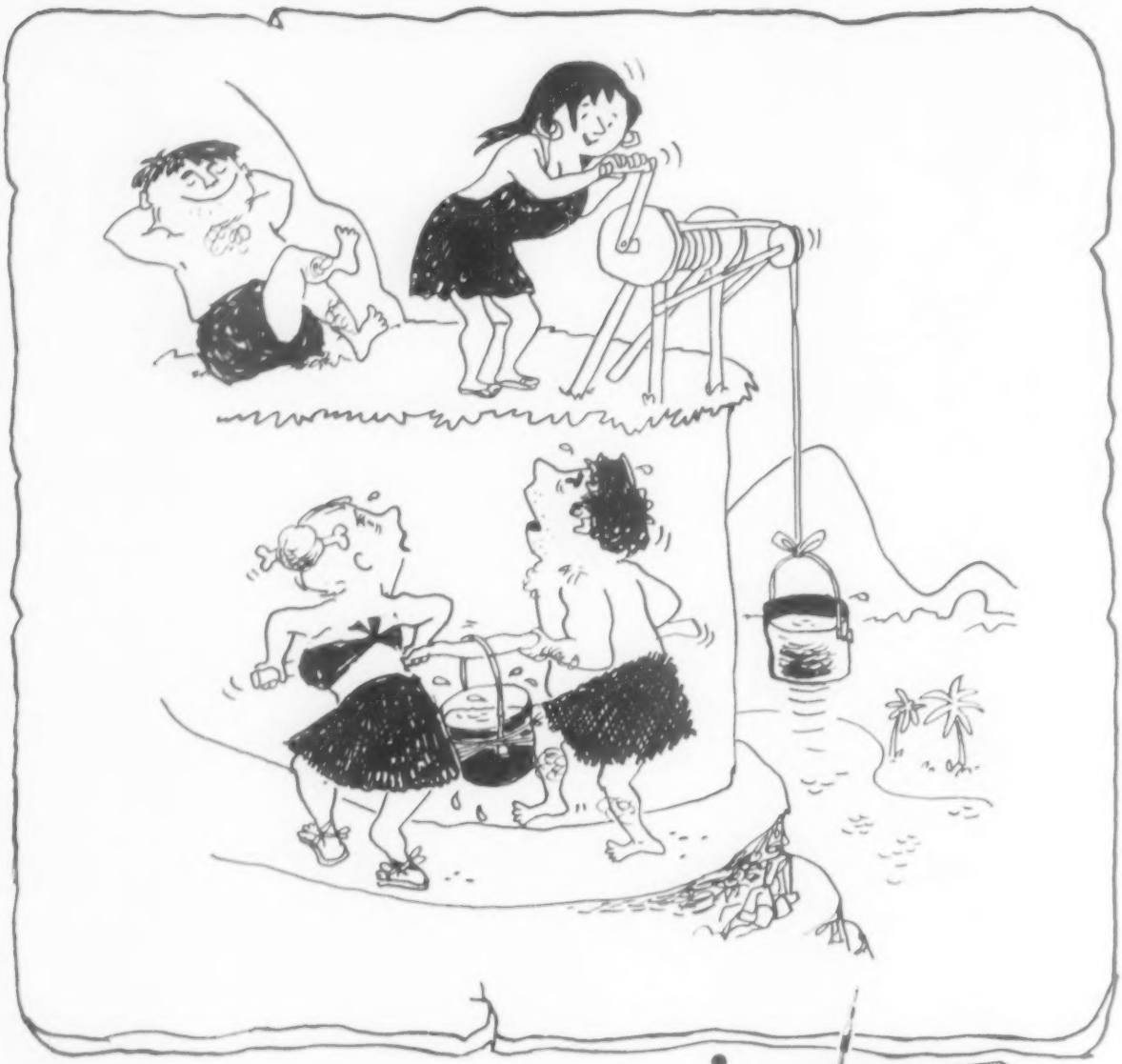


There's a better, easier way to pump oil wells, too...

Tackle an old problem in a new way and frequently you find it tremendously simplified. This is certainly the case with the Kobe *Free Pump* System of oil well pumping... some producers have found it easier to *Free Pump* wells than to flow them. As can be imagined, major economies result. The Kobe system frequently costs $2,000 to $4,000 per well less to install and 50% less to operate. If you are interested in such savings, why not drop us a line?

Our pictorial magazine, Pumping Trends, shows how KOBE is being used to simplify pumping problems everywhere. Write, we'll be happy to add your name to our mailing list.

KOBE, INC. *General offices: 3040 East Slauson Avenue | Huntington Park, California*

come and reducing expenses continue to be most important objectives for each of us."

K. S. Adams, chairman of the board, Phillips Petroleum Co., in January Philnews, company publication.

Atomic String for Bow

"The oil industry sees intense radiation as possibly opening the door both to producing its present products better and cheaper and to producing new products not yet dreamed of. It may give oil refiners a fourth string to their bow—the former three being heat, pressure, and catalysis.

"That fourth string may well be essential, if oil refiners are to turn out enough high grade products to satisfy world demand in the years to come."

Article in "Flying Red Horse," publication of Socony Mobil Oil Co., Inc.

CALENDAR

FEBRUARY

15-17 National Association of Corrosion Engineers Short Course for Pipeliners, Mayo Hotel, Tulsa.

19-23 American Institute of Mining and Metallurgical Engineers, annual meeting, Hotel Statler, New York City.

24 Natural Gasoline Association of America, Permian Basin meeting, Lincoln Hotel, Odessa, Tex.

26-29 American Institute of Chemical Engineers, Statler Hotel, Los Angeles.

27-29 American Association of Petroleum Geologists, Rocky Mountain Section, Auditorium, Denver.

MARCH

1-2 Southern Gas Association, transmission management conference, Jung Hotel, New Orleans.

7-9 American Petroleum Institute, Division of Production, Southern District meeting, Plaza Hotel, San Antonio, Tex.

12-16 National Association of Corrosion Engineers, annual convention, Statler Hotel, New York City.

19-21 Western Petroleum Refiners Association, annual meeting, Plaza Hotel, San Antonio, Tex.

21-23 American Petroleum Institute, Division of Production, Southwestern District meeting, Texas Hotel, Fort Worth.

24 North Texas Oil and Gas Association, annual meeting, Wichita Falls, Tex.

APRIL

3-5 Annual Corrosion Control short course, University of Oklahoma Extension Study Center, Norman, Okla.

4-6 American Gas Association, general management conference, Conrad Hilton Hotel, Chicago.

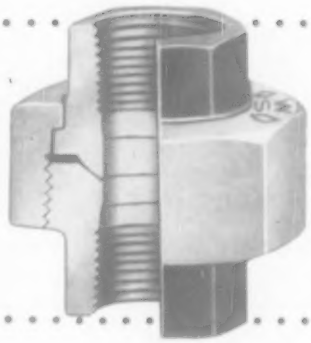
4-6 American Petroleum Institute, Division of Production, Mid-Continent District meeting, Broadview Hotel, Wichita, Kans.

8-13 American Chemical Society, general meeting, Dallas.

9-10 Texas Petroleum Research Committee, Ninth Oil Recovery Conference (Symposium on Natural Gas in Texas), Texas A. & M. College, College Station, Tex.

W-S FORGED STEEL UNIONS...

These Features are YOUR GUARANTEE of a Safe, Tight Union Connection:



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2. SPHERICAL-TO-ANGLE MATING SURFACES
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W-S Forged Steel Unions give you the kind of protection you need in high pressure piping systems. They're designed with precision-machined spherical-to-angle mating surfaces for positive seating, free from leaks even when pipes are slightly out of line. Cadmium-plated nuts resist galling and seizing and forged steel construction gives you the extra strength you need in high pressure service.

W-S Unions are available in 3000 lb. class, sizes ⅛" to 3" in screw-end and socket-welding types. Send today for your copy of Bulletin U-1.

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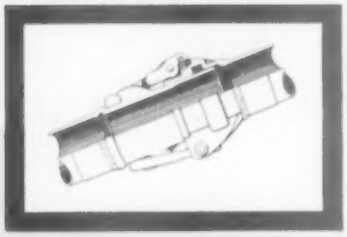

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FIRST IN INDUSTRIAL ALUMINUM PIPE

WINTER HAVEN, FLORIDA

"Another fine product in the *Racebilt* Line of Aluminum Pipe for Industry"

11-13 Natural Gasoline Association of America, Texas Hotel, Fort Worth.

14-15 Southern Gas Association, conference on use of electronic computers by engineering personnel, Hilton Hotel, El Paso.

14-18 Petroleum Equipment Suppliers Association, annual meeting, Boca Raton Hotel & Club, Boca Raton, Fla.

15-17 Texas Independent Producers and Royalty Owners Association, Statler Hilton Hotel, Dallas.

17-19 Southwestern Gas Measurement Short Course, University of Oklahoma, Norman, Okla.

18-20 American Petroleum Institute, Division of Production, Rocky Mountain District meeting, Cosmopolitan Hotel, Denver.

18-20 National Petroleum Association, semiannual meeting, Cleveland Hotel, Cleveland, Ohio.

19-21 Gas Appliances Manufacturers Association, annual meeting, The Greenbriar Hotel, White Sulphur Springs, W. Va.

23-25 Southern Gas Association convention, Dallas.

23-26 American Association of Petroleum Geologists and Society of Economic Paleontologists, annual meeting, Conrad Hilton Hotel, Chicago.

25-27 American Petroleum Institute, Division of Production, Eastern District meeting, Deshler-Hilton Hotel, Columbus, Ohio.

25-29 World Oil Exposition, Houston.

30 May 1 Independent Petroleum Association of America, semiannual meeting, Statler Hotel, Los Angeles.

30 May 4 American Petroleum Institute, Safety and Fire Prevention midyear meeting, Warwick Hotel, Philadelphia.

MAY

6-9 American Institute of Chemical Engineers, Roosevelt Hotel, New Orleans.

10-11 American Petroleum Institute, Division of Production, Pacific Coast district meeting, Statler Hotel, Los Angeles.

10-11 American Gas Association, Gas Supply, Transmission, and Storage Conference, Conrad Hilton Hotel, Chicago.

14-17 American Petroleum Institute, Division of Refining, midyear meeting, Montreal.

16-18 American Gas Association, Chemical, Engineering, and Manufactured Gas Production Conference, Benjamin Franklin Hotel, Philadelphia.

17-18 Rocky Mountain Petroleum Sections, joint meeting, Gladstone Hotel, Casper, Wyo.

24-25 Natural Gas and Petroleum Association of Canada, Sheraton Brock Hotel, Niagara Falls, Ont.

JUNE

17-22 American Society for Testing Materials, annual meeting, Chalfonte-Haddon Atlantic City, N. J.

24-25 Canadian Gas Association, Manoir Richelieu, Murray Bay, Que.

SEPTEMBER

11-13 Pacific Coast Gas Association, annual meeting, Coronado, Calif.

OCTOBER

15-17 American Gas Association, annual meeting, Atlantic City, N. J.

22-24 Rocky Mountain Oil and Gas Association, annual convention, Cosmopolitan Hotel, Denver.

THERMAL'S

COMPACT FIRED HEAT EXCHANGERS CAN SOLVE YOUR HEAT TRANSFER PROBLEM . . .

PRESSURE: 300 PSIG

TEMPERATURE: 1200 F

CAPACITIES: 750,000 TO 8,000,000 BTU/HR

TYPE DF for high pressure, high temperature applications.

PRESSURE: 50 PSIG

TEMPERATURE: 1000 F

CAPACITIES: 250,000 TO 1,500,000 BTU/HR

TYPE FT for medium pressure and temperature applications.

Unique THERMAL Burners make these heat exchangers possible —

Whether it be an existing standard design or a unit for your special requirements, THERMAL heat exchangers provide the ultimate in compactness, high performance and response. Always designed around the high velocity combustion characteristics of THERMAL burners, they are supplied as complete "package" installations including all control and accessory equipment.

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Send us your requirements. Our engineers will make a prompt analysis.

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Both the type DF and FT THERMAL Heat Exchangers use a coiled tube design feature to allow for expansion. The clear flame characteristic of the THERMAL Burner makes convection the primary heat transfer means and thus promotes uniform metal temperature and long life.

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- *Operate efficiently at high bottom hole temperature*
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Designed and engineered to step up your pumping profits on sandy wells, the new and improved D+B 3-Tube Pump incorporates 3 telescoping tubes that are loose fitting and free falling to handle highly abrasive fluids. Sand is kept in suspension by the turbulence set up by the loose-fitting precision ground plunger. You can also scavenge sand from the annular space between tubing and pump by an optional bottom discharge valve assembly. To eliminate galling and give longer service, the middle or standing tube is induction hardened.

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Serving the Oil and Gas Industries

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P-602

The OIL AND GAS JOURNAL

TULSA, OKLAHOMA

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JOURNALLY SPEAKING . . .

Incident at Press Time

LAST week, right in the big middle of trying to button up this week's Review and Forecast issue, our shop was thrown into a tizzy by an urgent request from a big oil company for a whole slew of figures about how the oil and gas industry did in 1955.

Ordinarily we would have said "Go to the foot of the line, Junior. You can wait until the book comes out, just like everybody else." But this case was different. The company wanted all possible statistics showing any comparison between the activity in natural gas and the activity in crude oil—drilling, production, reserves, and so on. It proposed to rush these figures to Washington for use in the Senate debate on the Harris-Fulbright bill.

This being such a worthy cause we turned our place upside down to comply—made photostats of work sheets, jerked manuscripts off the linotype machines to be copied, and worked printers overtime pulling proofs of pages already in type.

We don't know exactly how our figures are being used in Washington, but we know in general what they show. They show that development of new supplies of natural gas has been dropping off while development of oil supplies has been increasing—and all because of federal control of gas prices at the wellhead.

We know that for sure because the fact showed up plain as day in our own hurried and partial analysis of the statistics as they were being compiled. And we had rushed to tell the world about it in the editorial in the Journal's January 23 issue.

Incidentally, several thousand reprints of that editorial have been made (with our permission) by people in the industry for distribution to certain persons who aren't yet convinced that federal control is bad for the industry but who, alas, aren't regular readers of the Oil Man's Bible.

So, having scooped ourselves, so to speak, by spilling some of the figures in that editorial a week before the whole batch of statistics was due to come off the press, we made an exception and let this oil company have access to all of our figures.

What that company got in messy and disorganized form you now have in your hands neatly arranged, printed, and bound in this issue. We suggest that you, too, study the figures on the gas end of the business and see if you don't also come to the conclusion that federal control has not had a healthy effect. And maybe you, too, can think of some strategic places in Washington or elsewhere that you might send your own interpretation of what the record shows.

Dope for Deducing

WE related the above incident simply as an example of how valuable this annual Review and Forecast issue really is and of the uses to which it can be put.

We aren't bragging (much) when we say that our annual statistics are not only the first complete record to be published each year but also the best and most reliable. And the Big Yellow Book's figures are taken as authority by practically everybody. Even Senators from nonoil states who may curl a lip at our editorial comments respect our statistical integrity.

But of course our statistics aren't compiled for the purpose of influencing legislation. They are compiled for just one purpose—to give an accurate record of what the industry has been doing and where it is going. A great many conclusions and trends can be deduced from studying these figures. We have done some of this deducing in this issue, but anyone is free to make his own analysis and come up with something different or new.

And we know that just that is done all the time. Every January, dozens of people keep hounding us for our figures so they can make studies and forecasts for their own business purposes. And most people keep this annual issue on hand for constant reference all through the year. It's a pretty smart idea, too—as you probably have discovered for yourself already.

—*Henry D. Ralph.*

FILL YOUR CASING AUTOMATICALLY

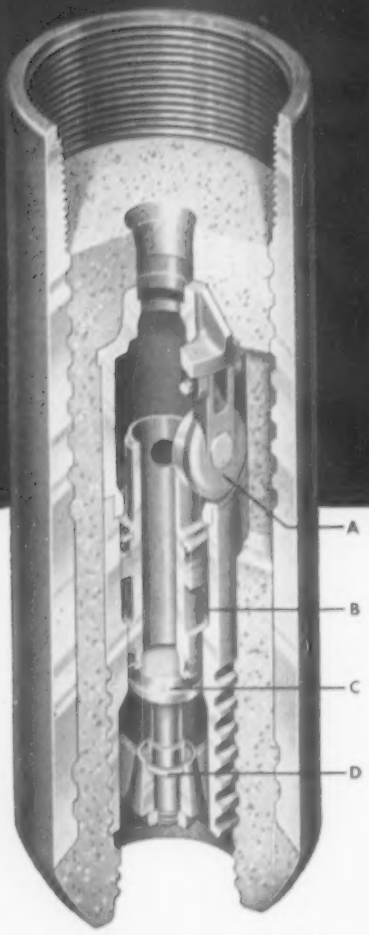
...from the bottom...while it's being run

with BAKER

- **DIFFERENTIAL FILL-UP SHOES** *and*
- **DIFFERENTIAL FILL-UP COLLARS**

Here's what DIFFERENTIAL FILL-UP Equipment does...

Permits the casing to *fill automatically from the bottom*, while it is being run, to within 90% of the fluid level of the annulus (using a shoe OR a collar)—or to within 81% of the fluid level of the annulus (using *both* a shoe AND a collar). In addition, a back-pressure valve is present to be used at the *discretion of the operator*, for "floating" or for cementing.



Baker DIFFERENTIAL FILL-UP Shoe, Product No. 1081.

A—Flapper Valve functions only at discretion of operator.
B—Sleeve Valve operates to control rate of flow and volume of "fill-up" fluid.
C—Sleeve Valve Seat.
D—Shear Ring is sheared. Flapper Valve now functions for floating or cementing.

Here's how Baker DIFFERENTIAL FILL-UP Equipment will aid you to avoid danger, increase rig efficiency, save valuable time and promote safety...

REDUCES THE DANGEROUS "RAM EFFECT" thus minimizing the hazard of breaking down a potential lost circulation zone.

SAVES COSTLY DRILLING MUD that might otherwise be lost to the formation due to the "ram effect."

MINIMIZES DAMAGE TO MUD CAKE on the wall of the hole. The majority of the fluid displaced as the casing string is lowered enters the casing instead of flowing up the annulus and causing possible damage to the mud cake.

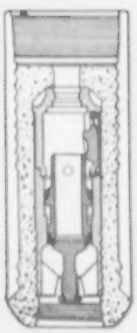
REDUCES DANGER OF STICKING CASING by reducing to a minimum the "no-motion time" formerly required to fill casing at the surface—extremely important when running casing in directional holes or sloughing formations.

SAVES ONE-HALF THE RUNNING-IN TIME plus the proven advantages of Baker Floating Equipment, including a back-pressure valve for cementing.

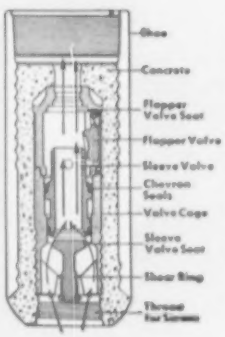
KEEPS THE RIG FLOOR CLEAN AND SAFE by eliminating the messy spill-over and splattering of mud present when casing is filled at the surface.

Ask any Baker representative or office for this new 16-page illustrated brochure...

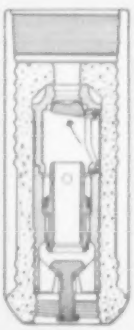
BAKER OIL TOOLS, INC., HOUSTON · LOS ANGELES · NEW YORK



When running-in, the Sleeve Valve is in closed position in contact with the Sleeve Valve Seat. When the Sleeve Valve is in this position, fluid entry into the casing from below the valve is effectively blocked. The Sleeve Valve will be in the closed position whenever the height of the fluid column in the casing (the fill) EXCEEDS 90% of the height of the fluid column in the annulus.



When the height of the fluid column in the casing (the fill) is LESS than 90% of the height of the fluid column in the annulus, the Sleeve Valve moves upward away from the Seat and permits fluid entry into the casing through the bottom of the FILL-UP Shoe. During the casing run, the Sleeve Valve opens and closes according to the pressures imposed on its top and bottom areas and thus automatically regulates the degree of fill.



When it is time for cementing, pressure of approximately 1,000 psi is built up in the casing to shear the Shear Ring that holds the Sleeve Valve Seat in the supporting vanes of the Valve Cage. The Sleeve Valve can then move downward sufficiently to release the spring-loaded Flapper Valve, and thereafter the FILL-UP Shoe functions as a conventional Float Shoe.

A good year if you play it right

THIS year looks like the best ever for all divisions of the petroleum industry. Activity is going to be greater all around than it was during the record-breaking year of 1955.

Just one word of caution should be noted: In most instances the 1956 increases over the preceding year will be smaller in percentage than the 1955 increases were. Another way of saying this is that the curves of demand and activity are still going up but they are rising less sharply than they did last year.

There is nothing alarming about this. The last half of '55 saw a spurt that surprised everybody and could not be expected to set the pace for the long pull. Averaging together the two years' gains shows the oil industry moving ahead steadily and at a rate which has come to be considered normal for it since the end of the war.

HERE ARE SOME KEY COMPARISONS: Domestic demand jumped 8 per cent last year but will be up only 4.5 per cent this year. But 4.5 per cent is an increase of 378,000 bbl. per day in the nation's consumption of petroleum products—a promise of brisk business for those who go after it right even though it won't be a sellers' market.

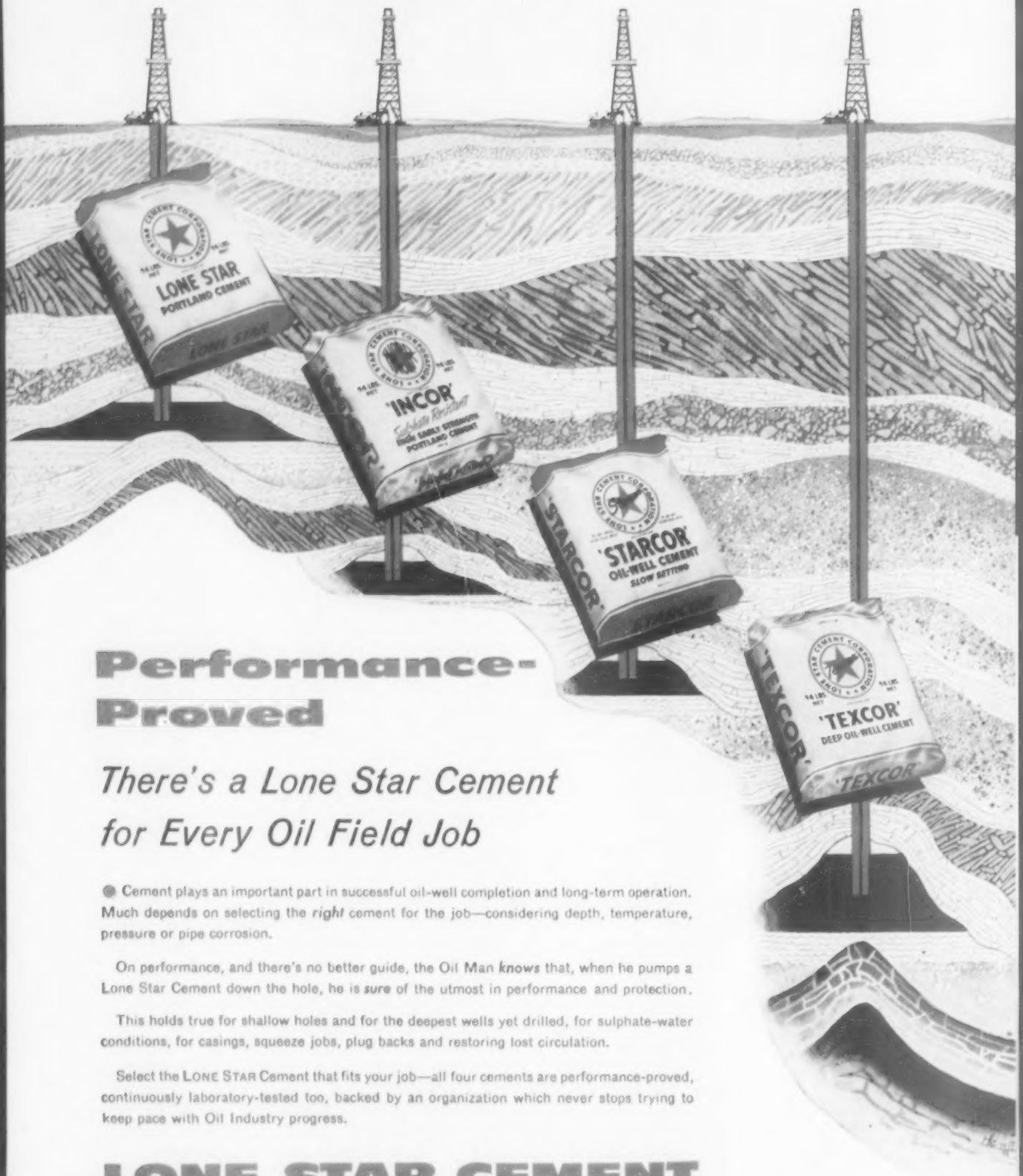
Crude production will go up 4.4 per cent in contrast to 1955's jump of 6.8 per cent. This forecasts some cutback from the high allowables of several states during the winter months, but not to the low point of last summer. The probable year's output will be less than many producers would like, but it will be better than they have done in the past.

Imports—as nearly as anyone can forecast them—will climb faster than domestic production—6.5 per cent over last year. But in 1955 they jumped 18.4 per cent over the preceding year. So perhaps the curve of their rise is flattening off.

Drilling will follow the same pattern. Total completions will be up 2.4 per cent, compared with 5.1 per cent last year, but that's an increase of 1,380 wells or nearly 4 per day. And deeper prospects indicate that total footage drilled will be up 4.2 per cent.

SO OIL WILL DO WELL THIS YEAR, better than many industries. The general level of economic activity is expected to increase by a smaller percentage than it did last year. This demonstrates again that oil's growth factor is above the average but is not completely independent of general business conditions.

How oil will do financially is less certain. Competition will still be very keen. Operating costs undoubtedly will keep rising. The industry's new capital expenditures to provide facilities to keep pace with demands will exceed 5.6 billion dollars. If 1956 is not to be a year of profitless prosperity, the industry will have to pay unusual attention to its prices and its income-outgo ratio.



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There's a Lone Star Cement for Every Oil Field Job

● Cement plays an important part in successful oil-well completion and long-term operation. Much depends on selecting the *right* cement for the job—considering depth, temperature, pressure or pipe corrosion.

On performance, and there's no better guide, the Oil Man *knows* that, when he pumps a Lone Star Cement down the hole, he is *sure* of the utmost in performance and protection.

This holds true for shallow holes and for the deepest wells yet drilled, for sulphate-water conditions, for casings, squeeze jobs, plug backs and restoring lost circulation.

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Current and significant in . . .

The Industry This Week

Exploration

• **Alberta's Greater Pembina area has been extended** 3½ miles to the northwest. Cal-Standard has brought in a Cardium producer on its $10½ million Cynthia Provincial Parcel. It's 18 miles northwest of Pembina field proper. P. 119.

Oil circles are buzzing over reports of a fabulous new oil strike in Kuwait. A northern wildcat, the 1 Raudhatain, reportedly not only is an unusually good producer from the Burgan but also has tapped another pay sand 1,500 ft. thick. P. 136.

Imports

• **The West Coast will turn more to imports this year.** Local production will hold at about 980,000 bbl. daily but this won't meet an expected 5 per cent increase in demand. Imports probably will jump from 95,000 bbl. daily to 155,000 bbl. daily. P. 123.

First-quarter imports are going to be higher than importing companies figured originally. Estimates given the Texas Railroad Commission still show, however, that product imports will be below the same 1955 period. But crude imports will rise about 11 per cent. P. 134.

Government

• **Look for the vote to be extremely close** on the Harris-Fulbright bill. Most polls now say both sides have about 45 votes with six undecided senators holding fate of the bill. P. 122.

Conservation is dead for another year in Colorado. A legislative committee has killed a proposal giving a state commission authority to order gas injection and to control oil production. P. 133.

Refining

• **The biggest refinery-expansion project ever undertaken** will be started soon by Kuwait Oil Co. Two 80,000-bbl. crude units will be added, bringing to 190,000 bbl. daily the capacity of the existing 30,000-bbl. plant in the little Middle East shaikhdom. P. 138.

Octanes are still going up, but not so fast as they were. The Du Pont survey shows the smallest October-January gain for premium in over 5 years. The unweighted average for premium at the start of '56 is 95.3. Regular is 88.0. The Ethyl survey lists the weighted-octane average on premium at 96.2 research. P. 128, 135.

Indiana Standard's Whiting Refinery is coming back fast. Crews are working right through winter snows to repair damage wrought by the Hydroformer explosion last August. They may have it running at full capacity of 220,000 bbl. daily late this spring. P. 130.

Industry

• **Look for 1956 to stack up as one of the best yet for oil.** The experts see a possible crude-price hike, high capital expenditures, increase in wildcatting. P. 116.

Industry needs more and better engineers, with the emphasis on "better." Atlantic's director of production research proposes: higher local school taxes, industry-offered counseling and teaching services, bigger college grants, good pay for scientists. P. 120.

What's Ahead for Oil in '56?

It will be a great first half. After that, things are a little uncertain. But in any case, this will stack up as one of the best years ever for oil.

This is the concensus of the Journal's Editorial Advisory Board, made up of top men in each division of the industry. Most see: High capital expenditures, a possible price boost, other favorable factors.

HERE'S how the experts view the oil industry for 1956.

. . . **General conditions** — P r ospects are good. Capital expenditures and prices will trend upward. Exploration will level off, may climb slightly if crude prices rise. Labor costs will be up with no solution in sight for shortage of technical help. The Harris bill is the most important single piece of legislation affecting the industry.

. . . **Exploration**—Offshore areas will continue to be hottest drilling scenes. Look for California to step up its offshore work. Over all, poor returns on wildcatting will continue and no new technological tools loom to make the oil explorer's task easier.

. . . **Production**—Great gains in oil flows will be noted from offshore leases and secondary-recovery projects. Unitization and conservation will get a greater emphasis.

. . . **Refining**—Interest is still keen in expanding into petrochemicals. In plant construction, trends to coking units and hydrogen treating will continue. Very few companies plan facilities for reformate extraction, cat-cracker recycle extraction, or pentane-hexane isomerization. Shortage of heavy fuel oil is believed temporary and will be relieved by adjustments in refinery runs. Octanes will edge nearer 100 with increasing use of alkylates.

. . . **Pipelining** — Greater emphasis will be put on automatic equipment. Steady program of looping and modernization is seen. No big crude-oil systems will be built. Boom in gas-line construction will continue.

. . . **Natural gas**—Government regulation and competition from other fuels pose many uncertainties. Most predict expanding markets, rising prices, and adequate new reserves.

Much rides on prices . . . Fifty-six per cent of the oil men queried think prospects are good for a crude-price increase after July. Most place the increase at about 25 cents.

Rising costs easily would justify a 25-cent increase immediately. One observer comments: "Chances are good for 15 or perhaps 25 cents more if labor increases 15 per cent and steel goes up another $4 a ton. But the price hike might not come until after the election—maybe in 1957."

A number of independent refiners operating on domestic crude, however, warn the current product price structure is such they can't meet a crude price increase.

One student of the industry declares the key to any price rise will be continued high demand, which can best be gaged at the end of the first 6 months.

Fat paychecks . . . An overwhelming majority of Journal advisers feel that oil industry labor will cost more this year.

About 42 per cent believe wages will go up 5 cents an hour while 46 per cent feel this increase will be 15 cents.

Typical comments: "Wages will go up as long as profits are high," and "This is an election year. Wages will go up."

Young folks lazy? . . . Oil companies are feeling the squeeze of the apparent general shortage of technical personnel.

Seventy-six per cent of those polled report the shortage is minor now and 21 per cent say they "are not bothered." Some have a few choice observations on recent technical graduates, calling them "lazy" and saying they "want big salaries before proving their ability."

The majority of oil leaders recognize that serious trouble in hiring technical help lies ahead. They suggest companies make more efficient use of their technical manpower, raise salary ceilings substantially and provide a prestige position for technologists in the ranges between 5 years' experience and the few highly paid management positions.

Exploration

The expert oil finders on The Journal board believe wildcatting in 1956 will be stepped up. They think wildcatting will increase its ratio to total drilling by 5 per cent.

Various factors are listed as favoring more wildcatting: Availability of more farmouts and fewer locations in developed areas.

Look offshore . . . All fingers point to a big year in offshore waters. Some think California will begin to share the drilling spotlight with the Gulf Coast in the search for oil on the nation's Continental Shelf.

Many observers point out 1956 drilling will be spurred by expiring lease obligations in the Gulf. Another stimulant is the excellent success so far in offshore operations.

One expert may have given the real incentive: "The Continental Shelf," he says, "is the most prolific new petroleum province of comparable area ever found in this country."

Other hot spots . . . Many observers tab the Rocky Mountain area as the second best spot for fast-paced drilling this year.

Other areas attracting attention are western Canada, South Louisiana onshore, and West Texas. Great possibilities still are seen for the southeastern states, the Anadarko basin, and the Panhandle of Texas and Oklahoma.

Some geologists, looking abroad, anticipate important wildcatting in Cuba, Italy, France, and Germany.

What about new reserves? . . . Results of 1955 drilling reflected less new oil

HUNDREDS OF THESE SETS of questions were sent to the Journal's Editorial Advisory Board. The object: To find out what industry leaders in exploration, production, transportation, and refining think is in store for the oil industry this year. The final report here is a cross-section of industry opinion.

found than in any recent year. The Journal asked its experts "Why?" and "Will it continue?"

Most oil explorers are optimistic that the trend will change. They say a single year is too short a period for comparison of success, adding: "We can't find a Scurry County every year—exploration success will run in longer cycles."

Another explains: "The drilling tempo is high. This results in poor selectivity of prospects."

Pessimists are numerous, however. One says "we need a new method of finding oil and until we get it this condition will continue." Others report "we're gambling on poor geology," and "too many third and fourth-rate prospects are being drilled by 'amateur' oil men."

The explorers say federal controls are a threat to the search for gas. "We don't look for gas now," they report. The more realistic admit that some new gas reserves will be uncovered in the search for oil. Most of it will be committed since many independents can't afford to wait years for a return.

New tools scarce . . . Geologists are disappointed with suggested new techniques for finding oil. No radical new method of search has appeared since the birth of geophysics, they say.

Some help has come from minor improvements of old tools, such as fracturing, new drilling methods, and more diagnostic drilling tools. One geologist says: "The drilling rig still is the best exploration tool we have, and possibly the most economical under normal conditions."

Radiation techniques may hold promise. One observer says, "The scintillometer is trying to tell us something in some areas—but what? We need faster-count instruments, slower airplanes, more data, more areas covered, and more interpretation before we can say where it will end up."

Geophysicists still need time to prove the worth of their newer techniques of interpretation and newer instruments. High-resolution and magnetic-tape recording have received favorable comment recently. These scientists eventually hope to be able to spot stratigraphic traps and sand pinchouts.

What's needed? The Journal panelists had many answers, among them: "Good, sound, studious geologists turned loose on stratigraphic studies," "better training for geologists and geophysicists," and "reinterpretation of data now dormant in files."

Production

Production experts say keep your eyes on two areas: Offshore operations and secondary-recovery projects.

Many believe rapid expansion and improved techniques will make offshore discoveries the most important areas of production in 1956. Larger operators look to the Gulf Coast to provide the major oil and gas finds of the year.

Offshore operations, however, aren't very appealing to the small producer. It takes big money to obtain leases and to develop them by drilling. Costs are expected to decrease as activity steps up and better techniques are learned.

Important advances to watch for include versatile drilling techniques and methods of installing gathering systems for producing wells.

Second time over . . . Some producers already are planning for the day when most of our production will come from secondary recovery.

Journal panelists report that for the time being projects are going to old producing areas and shallow fields. Water injection is being applied all over the country, but this year much more stress will be put on picking the right technique to fit reservoir conditions.

This selectivity, observers say, will mean increased interest also in pressure maintenance, unitization, and reservoir engineering. Producers think all must be properly combined for best results.

Unitization will get more emphasis this year. Many operators must be shown the economic advantages and higher profits of unit plans. In addition many deeper pools almost demand unitization for efficient and profitable operation.

These trends will be reflected on the political front. Conservation laws will become a part of the regulation program in more states. California may be the next large producing state to adopt one. Proration of water-flood production also may receive attention, especially in Texas.

Costs under attack . . . An all-out drive to cut production costs may get results in 1956. Management expects to direct its attack in these directions:

. . . Better supervision will train present personnel into filling more technical jobs. Rising labor costs and shortages of technical manpower will force man-

agement to get the most from its present staff.

. . . Efficient completion methods will get more attention. This means emphasis also on electric logging for quantitative measurements of producing formations and on core analysis to determine wettability for water flooding. The new fracturing processes and new cements developed also will be tested thoroughly as an avenue of cost reduction.

Pipelining

Experts in this field view 1956 as a year of catching up. They pin point these pipelining developments:

. . . Use of automatic equipment will come into its own.

. . . Construction emphasis will be on looping, modernization, and replacement of old systems. No new large crude-oil or products systems are seen.

. . . Big gas lines will continue to be planned and built, regardless of federal control.

Automation . . . Pipeliners say that automatic custody transfer of crude oil at lease tanks generally will be accepted this year.

But the industry still will be feeling its way with a new concept and new equipment. Several trial installations using both p.d. meters and dump tanks are in use and operating well. Fully automatic operation with these units will start this year.

Labor saving isn't the big incentive for moving toward automatic custody transfer. Some observers see little actual reduction in labor costs. Two other factors are more important: More accurate measurement of volume and oil properties, and more efficient use of line and station equipment.

One company official reports "with close control over operations that automatic equipment gives gathering lines and pump units can be sized closer and line loads can be stabilized."

Housekeeping . . . Even if no big crude-oil systems are on the boards this year, there will be plenty of construction work available.

The experts report "the emphasis through the industry will be on continued modernization, short extensions and loops. Product-line construction should be high because some major extensions and loops are planned."

One development to watch: There'll be a trend toward laying small lines away from major terminals to nearby satellite towns. The products line to the corner service station won't come this year—but it's on its way.

Caught in bind . . . Price control over natural-gas producers won't have much effect on gas pipeline construction this year, since reserves already are committed.

Some observers say "don't expect a slowdown of line construction as long as financing is easy and equity capital outlay is small." One adds: "If there is a good market and a good supply, lines will be built regardless of controls. Particularly is this true where gas is associated with oil and must be produced to get the oil."

New equipment . . . Outstanding development here is the increasing reliability of remote controls.

Other noteworthy developments to receive attention this year include package-type pump units, large high-speed stationary dual fuel engines, measuring and sampling devices which will make automatic custody transfer possible and minimize tankage requirements, expansion of microwave and carrier equipment to allow use of more channels, improvements in equipment for cooling coatings and padding pipe.

Refining

Refiners haven't finished the octane race. It will continue through 1956.

Most experts feel octane numbers nationally will rise on both regular and premium gasolines from ½ to 1 number in 6 months and from 1 to 3 numbers in the year.

The majority of the companies surveyed say this will result generally in use of more alkylate in motor fuel. One refiner reports: "We will use more alkylate at locations without adequate catalytic reforming units and in the future to give a balanced 100 octane fuel."

Another says: "Use of more alkylate in motor gasoline will increase as octanes move higher. This may be temporary, however, until other processing equipment can be installed."

Most of the refiners say, though, they are not planning to install new facilities this year for reformate extraction, cat-cracker recycle extraction, or pentane or hexane isomerization. They express interest in learning more about advantages of the processes. More than half say they have plans for installing hydrogen treating equipment.

What about residual? . . . The current shortage of residual apparently will have little basic effect on the refining industry.

Most believe the shortage will not slow down installation of new coking units—at least not until residual prices rise enough to make coking uneconomical.

New cokers may be delayed in some areas where transportation costs to the point of residual consumption are low. The concensus is that the long-run trend will be toward making propulsion fuel and less burning oil.

Increased use of asphalt in the stepped-up highway construction program likewise will have little effect on refinery plans for new units this year. Refiners believe there are enough potential asphalt producing facilities to supply demand.

The increased demand could mean refining of more low-gravity crudes and could influence some small refiners to forego coking in favor of producing asphalt over residual.

Most refiners feel the residual shortage is only temporary. It will end when the price of heavy fuel reaches a point where it is economical to do less severe cracking and increase fuel oil production.

Lure in chemicals . . . The petrochemical field still packs powerful interest for refiners.

More than half the companies polled say they are surveying petrochemical possibilities. These include ammonia plants and facilities for extraction of ethane, ethylene derivatives, butadiene, styrene and aromatics.

Natural Gas

The future of the natural-gas industry is full of uncertainties. The men in the business say these stem from problems raised by government regulations, competition of other fuels, and a possible shortage of new gas supplies.

But there also are optimists who predict expanding markets, rising prices and adequate new reserves.

Price confusion . . . Members of the Journal Advisory Board hold a mixture of views on the outlook of natural-gas prices which has become such a controversial issue in debate on the Harris bill. Their discussion centers around:

. . . Field price of gas. The experts were asked at what field price gas would lose its distant interstate market to oil and coal.

Most say somewhere between 22 and 25 cents per M.c.f. Among the extremists, one says the price might go to 40 or 50 cents, and another feels 15 cents will be the limit.

One authority writes: "It is believed a realistic ceiling at the well is between 18 and 20 cents per M.c.f. At present the over-all average price on the Gulf Coast is about 12 cents. When it reaches 18-20 cents, long-line companies will begin to price themselves out of the market."

Still another replies: "Gas is already at competitive price levels in some important industry consumption areas. I

believe its position varies according to location of other field sources."

. . . Market-demand proration. This is being considered by conservation commissions of several producing states. How will it affect the price and supply of gas for interstate transmission?

Here's a sampling of the opinions of panelists: "Will increase the price," says one. "Shouldn't have any effect," says another. "It probably would raise prices," says a third.

Other comments:

"The supply would be affected in that it would require large interstate gas transmission companies to exchange gas in order to meet demands. But price would not be affected."

"It would tend to reduce drilling and eventually curtail production and supply. Naturally the price will increase."

"It would at least stop price reduction but will precipitate federal legislation if carried to extremes by forcing an increase in gas prices."

Crippling controls? . . . Everyone has a different idea on how federal controls will affect development of natural-gas supplies.

A half dozen advisers emphatically assert regulation will reduce the supply. One comments: "Owners of gas reserves are reluctant to commit them to interstate markets at the present." Another asks: "How much new gas reserve was dedicated in 1955 outside of deals that were set up in 1954 and only formally ratified in 1955?"

Some experts qualify their views. One points out: "Between 40 and 50 per cent of gas in long lines is produced in association with crude oil. This has to be marketed to produce the oil."

What next? . . . The next big interstate natural-gas pipeline, according to the panelists, will be among these possibilities:

. . . Offshore Gulf to Florida, to northeast or to Great Lakes area.

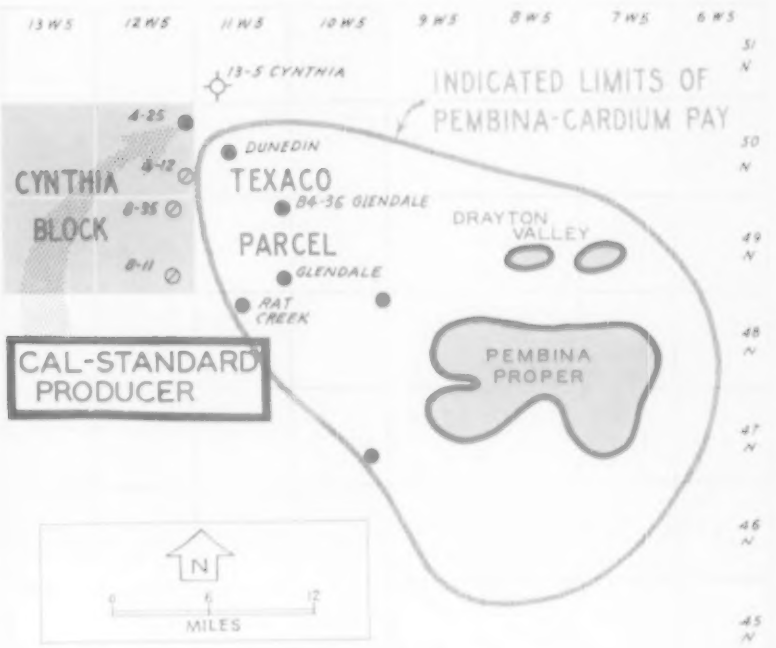
. . . Canada-Williston basin to Kansas City.

. . . Canada to New England and Middle Atlantic states.

But surely there must be a ceiling to the steady upward growth of demand and pipeline building. Most experts agree. Some think the ceiling will depend on industrial demand, or supplies of low-cost electricity generated with atomic heat, or the future price position of gas.

The industry still will enjoy a steady growth with only the rate of expansion slowing down, they think.

One tip for the future: Look for several offshore gathering lines to be started this year to tap gas reserves in gulf waters.



Cal-Standard Strike Extends Pembina

EDMONTON.—Alberta's greater Pembina area took a 3½-mile stride northwestward last week when the California Standard Co. announced completion of the first well in its expensive Cynthia Provincial Parcel.

The well is Cal-Standard's 4-25 Northeast Cynthia. Location is 18 miles northwest of Pembina field proper and about 3½ miles from nearest production.

The wildcat reportedly was taken to a total depth of 7,010 ft. Production is from the Cardium sand at about 5,800 ft. Cal-Standard released no further details. The company has three other wildcats drilling in the block. They are on a straight line south of 4-25 N.E. Cynthia *(The Oil and Gas Journal, October 31, 1955, page 62)*.

Cal-Standard is reported going below the Cardium on the three southern wells for testing before plugging back to the Cardium pay.

The company bought the 92,160-acre Cynthia block for $10,500,002 at the Alberta crown lease sale last June 14. The acreage lies immediately west of a tract for which Texaco Exploration paid $13,000,000 in January 1954. Texaco has drilled five successful Cardium wells on its tract.

Northern extension of the greater Pembina area apparently has been cut off by poor showing of Imperial Oil, Ltd.'s, drilling program on its Cynthia tract north of the Texaco lease. Imperial paid $11,000,000 for the tract, then drilled six dry holes.

(For additional information on the Cal-Standard well, see page 337).

Deep Well Bottomed

British-American Oklahoma test could set state record

CHICKASHA, Okla.—British-American Oil Producing Co. has bottomed its 2 Harrison prospective new Oklahoma deep producer in Grady County at 15,310 ft. in the third Bromide sand.

The operator last week stuck a 5-in. liner at 15,250 ft.—60 ft. off the bottom—while trying to run the liner to total depth before production tests.

Plans were to hang the 5-in. from the bottom of a string of 7-in. cemented at 14,914 ft. Unless the stuck liner could be freed and worked to bottom quickly, the operator planned to cement it at its present depth.

Early in January the wildcat developed a maximum flow of 13,750,000 cu. ft. of gas daily during a drill-stem test of the second Bromide. This was at a depth first reported at 14,977 ft.

This depth last week was corrected tentatively to 14,960 ft.

Despite the revised depth measurements, the deep test—if it develops commercial production—still would be the state's deepest producer.

This Is the Third . . .

. . . In a series of five articles on the shortage of technical personnel.

The first two were an interview with Monroe E. Spaght, executive vice president of Shell Oil Co., and an article by A. H. Mitchell, a director of Carter Oil Co.

The two remaining articles will present the views of the superintendent of a metropolitan school system and the head of the Texas Society of Professional Engineers.

Here's what we can do:

Raise local school taxes . . .

More—and *BETTER*—Engineers Needed

By L. P. Whorton

Director of Production Research
Atlantic Refining Co.

THE shortage of technical people is difficult for industry and dangerous to the national welfare.

This is generally agreed. It is also generally agreed by most of those who have been vocal in the matter that whatever is to be done must be done under the initiative of industry or organized groups of technical people — college alumni or technical societies.

Many practical suggestions have been made. And there are indications that action is being taken in some quarters to implement these suggestions. But the time for talk is past. Emphasis should now be placed on action.

What Are the Needs?

Nearly every statement about the needs has been in terms of numbers. I believe, however, that the emphasis is misplaced.

Quality, not quantity . . . The need is primarily one of quality, not quantity.

This was set forth very adequately by Dr. James R. Killian, president of Massachusetts Institute of Technology, in his annual report for 1955.

Too many technical personnel are now in positions requiring abilities which they do not have—such as thinking in terms of scientific concepts. Mature technical personnel in positions of responsibility haven't been able to keep abreast of scientific advances made in recent years. The burden of supplying this up-to-date knowhow must fall on the younger men who are now graduating.

The greatest need, as Dr. Killian has pointed out, is for men who are thoroughly trained in basic subjects, including nontechnical ones such as economics and English, who can bring to bear scientific analytical ability and modern technology on industry's problems.

This shortage of well-trained, imaginative personnel is already affecting research adversely. I wouldn't say that there are problems that are being ignored for want of good manpower. But some important projects aren't getting the emphasis that they should because we can't find the right men for them.

Weeding out needed . . . One reason we don't have enough technical personnel with analytical abilities is that we lose too many of the total number who graduate.

It has been estimated that 40 per cent never advance beyond nonprofessional technician's jobs or technical aide jobs. Another 40 per cent go into management. That leaves only 20 per cent to handle professional engineering tasks.

To suggest that the solution lies in barring engineers and scientists from management is to miss the point. Management needs more, not less, technological background. I think industry generally is doing a good job of utilizing the technical manpower that is available. I don't think there are any real engineers being misused, that is, none who can contribute in a substantial technological way.

We need to weed out inferior prospects in college to make room for those who will measure up to today's exacting demands.

What Should Be Done?

By industry . . . Much has been said about the awareness of the country of the shortage of technical personnel.

Yet there is reason to believe that some managements in industry still do not view the situation as alarming.

The National Association of Manufacturers recently polled 3,100 company presidents on what active steps they were taking to aid schools in their various communities. Only 20 per cent bothered to answer. The inference must be that the presidents were either ignorant of, or indifferent toward, the present emergency.

Why is this?

In part it is because of complacency; some managements don't face any problem until it has assumed disastrous proportions.

In part it is because they don't visualize the long-range investment in this type effort as paying great enough returns. They apparently aren't aware of the relationship between technology and industrial profits, or the lack of technology and industrial losses.

And in part it is because they hope to reap a harvest from others' investment. They want to "let Joe do it."

Some members of industry are assuming this responsibility. To furnish

offer schools our services . . .

raise college grants . . .

and pay our scientists well

a list of these is not the purpose of this discussion.

Most of the trouble can be traced back to the lack of interest in a scientific career on the part of secondary-school students. There is a need for better high-school preparation for college work in technical subjects. And this stems in part from poor counseling and in part from inadequately trained high-school science teachers who must be relied on to stimulate the interest of prospective science graduates.

The N.A.M. report sets forth the role businessmen should play in helping to overcome this problem of a shortage of science teachers. These boil down to community efforts to raise teachers' salaries, increase their recognition for their contribution, and provide support and advice where needed.

Technically trained men will be more likely to do this if their employers support them in the effort.

By technical societies . . . Much of the need for additional counseling of young people can be provided through organized efforts of technical societies.

Ways in which this should be organized are yet to be worked out. But groups in some areas are already forming consultants' pools on which schools may draw for spot instruction or counseling.

Before much can be done, however, we need to dispel the suspicion surrounding efforts to recruit youngsters into technical careers. An honest discussion of motives behind such activity has been suggested to remove the mistrust.

This has been mentioned by the editor of Chemical and Engineering News as a proper problem for the American Chemical Society to attack at a national meeting.

By colleges . . . Colleges, by themselves, or with financial assistance from industry, can help by means of summer sessions for high-school science teachers.

They can also set up a program specially designed to prepare students of science and engineering for teaching in secondary schools. Some efforts in this direction are being made and are said to show signs of fruitfulness.

But in the main, I think it is industry's problem. If industry put as much concentrated effort into solving the fundamental problem as it is now putting into recruiting, and if it supported this effort with financial grants to the best of its ability, this problem would be corrected in a few years.

What Industry Must Do

Industry needs to do five things:

. . . Encourage technical personnel to participate in local community activities designed to help the local secondary schools and the secondary-school pupils.

This may involve counseling, serving in various capacities to help increase the attractiveness of teaching as a career, or helping the science teachers themselves in providing stimulating scientific instruction.

While we're searching for new teaching sources, we shouldn't overlook the possibility of attracting more women to science. This branch of secondary-school teaching has been dominated by men heretofore, although women comprise the bulk of primary and secondary school teachers.

Women are barred by convention from many phases of the oil business. But they're not handicapped in teaching. And women aren't so likely to be lured away by industrial jobs.

Basic to any solution of the school problem is increased local tax support. Local people are not paying enough to maintain adequate standards. They're going to have to be sold on the need for paying more.

. . . Encourage technical personnel to participate in whatever action the technical societies take.

. . . Hire high-school teachers for summer jobs in technical surroundings.

This will help increase the teacher's income and his enthusiasm for what his pupils look forward to in a technical career.

. . . Step up support for colleges, particularly the independent colleges, by grants in aid, scholarships, and fellowships.

. . . Make sure that there is always a proper difference in pay between professional and nonprofessional personnel.

It is not enough to sit back and hope that the schools by themselves will somehow start turning out the quality and quantity of engineers the country needs. The major initiative must come from top-level management of industry.

If industry had an equally big stake in a private business venture, you can bet it wouldn't hesitate to act.

The trouble is that industry can't see in dollars and cents how it will pay off. Industry can't be taxed to do this job. It has to be a sort of "bread upon the waters" justification. For its own enlightened self interest, industry must act to meet this need.

Gas Bill Nearing Vote

First test of strength will come when amendments taken up; six senators may determine final fate of measure

WASHINGTON.—A word-weary Senate is looking forward this week to final vote on the bill to exempt independent gas producers from federal regulation.

With 10 days of debate behind them, senators hope now quickly to dispose of a number of amendments which will be offered by opponents of the Harris-Fulbright bill in an effort to scuttle it.

There is a possibility the bill may come up for final vote before the end of the week.

But Democratic leaders warn privately the fight might go on for another 10 days or 2 weeks. With no major measures demanding quick action, leaders are exerting no pressure to limit discussion.

Big show . . . Sen. Paul Douglas of Illinois was the star performer in the debate last week.

In a series of "chapters" of a long speech delivered over a period of days, he outlined, argued, and summed up the opposition to the bill.

Both sides are claiming votes. But both sides are "running scared." Douglas, appearing on a television program, said he figured 45 senators were for the bill, 45 against it and 6 on the fence. That tallies pretty well with other polls, emphasizing that passage or defeat of the bill rests in the hands of a half-dozen or so members.

But the real problem may be to assure that senators are on the floor when the vote comes up. A few members who, for one reason or another, didn't want to disclose their stand on the issue—and there are some—could make or break the bill by failing to vote.

Amendments next . . . As soon as general debate winds up, the Senate will get down to voting on amendments. Members from the coal-producing states, will try to get their "conservation" provision adopted, but are expected to vote for the bill even if they fail. Otherwise, the amendments are being brought in by opponents of the measure.

The amendments will be offered, discussed, and voted upon one at a time. Since the Fulbright version is the bill before the Senate, any amendments adopted will be tacked on to that measure.

After all amendments from the floor have been acted on, one last amendment will be offered. It will be in the form of a motion to substitute the Harris bill for the Fulbright measure. If this is accepted, the move will wipe out all the changes previously written into the Fulbright bill.

Test vote . . . The vote on the motion to substitute, therefore, may be the tip-off on whether the legislation will go to the White House.

If the Harris bill is substituted, supporters of freedom for the gas producers are confident it will pass. But if it fails and the Fulbright bill is passed, with or without crippling amendments, it will have to go back to the House. Chances there of final action this year would dim.

Line Decision Due

Aid for Gulf-East Coast project up for review

WASHINGTON.—The long-delayed decision on government support of a Gulf-East Coast pipeline may be reached next month by Mobilization Director Arthus S. Flemming.

Two proposals for such a line, sought as a safeguard against disruption of tanker movement in an emergency, are being given what may be their final review.

The idea of a crude line from the gulf to the New Jersey refining area has been under study for many years. Various plans to get facilities which could replace water transportation in wartime have been considered. Last year they boiled down to two proposals. Texas Eastern Transmission Corp. offered a plan for converting the Big Inch line, originally built for oil products and now carrying gas. American Pipe Line Corp. came in with a plan for a products line from Port Neches, Tex., to Newark, N. J.

Details of the competing plans were disclosed at a public hearing held by Flemming last September *(The Oil and Gas Journal, September 19, 1955, page 90)*. Both plans called for government support, and it is this question that has held up a decision.

The Interior Department's oil and gas office has filed another report with the ODM on the matter. It reaffirms its recommendation last year that no government aid be extended.

Surety Parley Set

Drillers' ideas awaited on offshore insurance

AUSTIN.—A conference to work out plans for insurance to cover injuries to workmen on Texas offshore drilling operations has been delayed, probably until the week of February 13.

Angus McDonald of the casualty division of the Texas Board of Insurance Commissioners said the conference has been delayed to permit the insurance committee of the American Association of Oilwell Drilling Contractors to meet January 31 to work up proposals to the Insurance Board and the insurance industry representatives who will meet. A specific date will be chosen by January 31, McDonald said.

The question has arisen whether regular Texas workmen's compensation laws and regulations, as well as insurance policies, apply on offshore operations.

Some insurance companies have obtained licenses from the Department of Labor under the Longshoremen's and Harbor Workers Act. Others are writing insurance under a special set of rates adopted temporarily by the Texas board, setting offshore workmen's compensation and employers' liability rates at 50 per cent above the onshore rates. These rates are to remain in effect until the conferences, and a board hearing, establish new ones.

A recent U. S. Supreme Court decision in the Martin case injects a third possibility into insurance coverage of offshore drillers. In that case it was held that a movable drilling barge is a "vessel" and that injury claims, if not settled, may be litigated in federal court under the Jones Act which applies to masters and crewmen on ships.

Shale Mine Becomes Lab

WASHINGTON.—The Government's oil-shale mine at Rifle, Colo., is about to become an underground laboratory.

The closing of the oil-production program at the Rifle laboratory last year ended the need to work the mine for shale. But the mining operations, marked by roof cave-ins, showed the need for study of mining practices.

A $1,000,000 appropriation will make it possible for the Bureau of Mines to drive new entrances to the shale formation and resume studies.

Bureau officials said that safety will be one of the main objectives. Any commercial operation by industry to develop shale for oil in the future must consider the welfare of underground employes along with mining costs.

Imports vital to West Coast . . .

. . . Demand Tops Local Output

LOS ANGELES.—Imports will play a greater role in the West Coast supply picture this year.

California fields can't meet the 5 per cent increase in domestic demand expected by most oil company economists. Local fields will be able to maintain only their current level of about 980,000 bbl. daily.

Crude imports during 1955 averaged approximately 95,000 bbl. daily. Of this flow 34,000 bbl. came from Canada and 61,000 bbl. from the Middle East, Sumatra, and other foreign fields.

This year the flow of Canadian crude is expected to average 55,000 bbl. daily, due to increased operations at the new Washington refineries of Shell Oil Co. and General Petroleum Corp. Imports of other foreign crudes will approximate 100,000 bbl. daily, economists of one large company estimate.

Much of this will be brought in by Tide Water Associated Oil Co. During the first 4 months of this year the company has stated it expects to import about 40,000 bbl. daily. Union Oil Co., not yet an importer, is negotiating for 10,000 bbl. daily of Venezuelan crudes.

Big growth . . . West Coast demand will average 1,276,000 bbl. daily, according to some forecasts.

Domestic demand will be up 50,000 bbl. as the result of normal growth and the area's greater dependence on steam plants for electric power. Military demand will average about 123,000 bbl. daily, up 6,000 bbl., because of greater demand for jet fuels.

Total demand, however, will remain at last year's level, it is expected. Export and intercoastal shipments are expected to decline to about 71,000 bbl. daily. Last year they averaged 128,000 bbl. Principal reason for this drop is an easing off in the extraordinary demand for fuel oil on the East Coast.

Last year this movement, some of which was at distress prices, averaged 34,000 bbl. daily. An additional 10,000 bbl. daily moved to Atlantic foreign ports. Intercoastal and foreign shipments of fuel oil this year therefore are expected to total only about 45,000 bbl. daily.

Movement of light products into eastern Washington and Oregon from Rocky Mountain refineries averaged 50,000 bbl. daily last year. In 1956 a portion of the Arizona market will be lost to Texas refineries as a result of the new Southern Pacific Pipe Lines, Inc., carrier from El Paso to Phoenix. This 8-in. line has a 13,600-bbl. daily capacity. This movement of refined products into the West Coast area is expected to increase to about 55,000 bbl. this year.

The over-all picture on the West Coast is for an excellent balance in supply and demand. Aside from a possible buildup in residual fuel stocks, which were down to about 14,000,000 bbl. at the year's close, total petroleum inventories are not expected to change materially from the estimated 105,000,000-bbl. level at which they closed out the year.

Deep Trend Hinted

Unusually thick Devonian pay hit below 9,500 ft.

KERMIT, Tex.—The possibility of a new deep trend running some 25 miles from Monahans on the south to north of Kermit is indicated by a Winkler County wildcat discovery.

Drill-stem tests at the Richardson Oil 1-B Stanolind point to production over a 940-ft. gross section in the Devonian, or Silurian-Devonian. This strike, and other recent ones in the region, raised hopes that 1956 will be a year of deep discoveries in the Permian basin area of West Texas and Southeast New Mexico.

The Richardson-Stanolind well is located 8 miles southwest of Wink, between Monahans and Kermit. Operators drilled into the Devonian at 9,510 ft.

On drill-stem test at 9,550-9,603 ft., open 1 hour and 45 minutes, 55° distillate flowed in 21 minutes, cleaned into pits for 9 minutes, then gaged 19.32 bbl. in 1 hour. Gas volume was at the rate of 8,400 M.c.f. per day. Flowing pressure ranged from 1,800-2,000 psi., and 4,280 psi. when shut in 30 minutes. Recovery was mud and oil with no formation water in evidence.

Several tests were run on sections between 9,550 and 10,459 ft. The best distillate flow was 28 bbl. an hour from 9,603-53 ft. Gas volume was about 8,400 M.c.f. daily, with flowing pressure 3,160 psi. maximum, and shut-in pressure 4,300 psi.

The only test which failed to flow was from 10,280-10,327 ft. Gravity of the oil dropped to 39° at 10,400 ft.

Drilling proceeded toward a contract depth of 13,500 ft.

Industry BRIEFS

HOUSTON.—Rycade Oil Corp. has purchased 49 producing oil and gas wells and a natural-gasoline plant with a capacity of 12,000,000 cu. ft. of gas daily in West Texas. The property was acquired from C. V. Lyman, Midland, Tex. Price was not disclosed.

TULSA.—Mid-Continent Pipe Line Co. has acquired full ownership of a 26-mile natural-gasoline line in Carter and Stephens counties, Okla., which it owned jointly with Kerr-McGee Oil Industries, Inc. The 4-in. line will pump 2,500 bbl. daily from four gasoline plants to D-X Sunray Oil Co.'s Duncan, Okla., refinery. It's the company's first pipeline for exclusive movement of water-white gasoline.

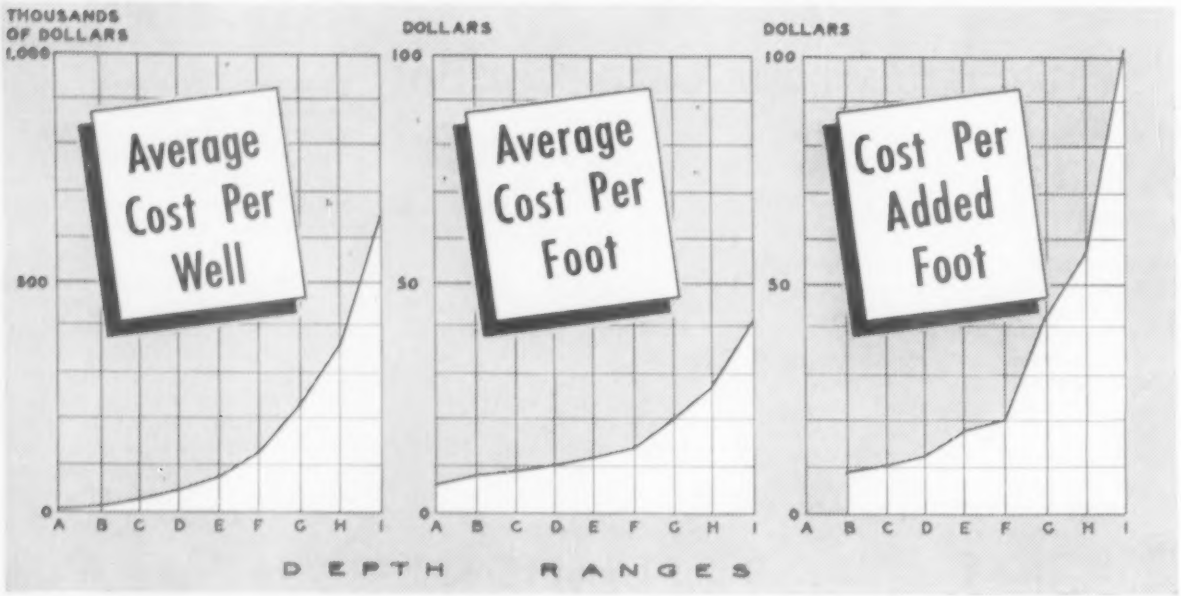
DENVER. — Colorado Oil & Gas Corp. has bought the oil and gas properties of Honaker Drilling Co. and Honaker Drilling, Inc. The purchase includes approximately 500 bbl. daily production. The new production will increase Colorado Oil & Gas daily oil production to 7,000 bbl. Joe J. Honaker headed the two drilling companies.

OKLAHOMA CITY.—Oklahoma's crude oil allowable for February was set at about 590,000 bbl. daily, unchanged from January. But conservation director Massena B. Murray called for an extra 5,000 bbl. daily requirement for new wells. Nominations were up 9,820 bbl. to 548,658 bbl. daily, highest in recent years.

BARTLESVILLE, Okla. — Hydrocarbon & Construction Corp. will build a 200-ton per day ammonia plant in southeastern Washington for Phillips Pacific Chemical Co., jointly owned by Phillips Petroleum Co. and Pacific Northwest Pipeline Corp. It will be located 7 miles southeast of Kennewick on the Columbia River.

The first ammonia plant in the area based on natural gas, it will be supplied with 15,000,000 cu. ft. daily by Pacific Northwest *(The Oil and Gas Journal, October 10, 1955, page 118).* Completion is due late this year.

LITTLE ROCK.—Arkansas Louisiana Gas Co. is making long-range plans for a $50-million pipeline from the Texas-Louisiana coastal area to northern Louisiana. The line, still in the early design stage, would connect with the company's present system and insure additional supplies for future needs of industrial gas users in Arkansas.



Three industry groups find out . . .

. . . What It Costs to Drill in the U.S.

THE oil industry has been quizzed for years, by people in and out of the business, on how much it costs to drill and equip a well for production.

Now someone has come up with the answers for every state in the United States and for all depth ranges. The most comprehensive survey of its kind ever undertaken, it was a joint effort of the American Petroleum Institute, the Independent Petroleum Association of America, and the Mid-Continent Oil and Gas Association.

The study unearthed several interesting comparisons. It also points up one of the hard economic facts of the business. The average depth of wells is increasing all the time, and costs will rise much faster in proportion.

How study was made . . . The survey was based on drilling statistics for 1953 from The Oil and Gas Journal.

Questionnaires were sent to all producing companies in December 1954. Replies covered almost one-third (30.29 per cent) of the 49,279 wells drilled during 1953. The reporting companies drilled 36.67 per cent of the 198,839,000-ft. total and accounted for 42.72 per cent of the $2.5 billion spent on this branch of the industry.

From this strong sampling, statistics were calculated for the entire nation and industry. The costs embrace everything incidental to drilling and completing a well for production up to and including the christmas tree. Such facilities as tank batteries, separators, or flow lines are not included.

The figures will not be exactly the same as this year's, as costs have risen since 1953, particularly offshore where drilling has moved into much deeper water the past 2 years. But they nevertheless will provide the best picture ever available.

What survey shows . . . Two things seem to stick out boldly in the survey.

One is the wide variation in costs from one part of the country to another

Depth Ranges

A	0- 1,250
B	1,251- 2,500
C	2,501- 3,750
D	3,751- 5,000
E	5,001- 7,500
F	7,501-10,000
G	10,001-12,500
H	12,501-15,000
I	Over 15,000

Average Drilling Costs in the U. S.

Depth range—	Wells drilled U. S.	Total footage (000 ft.)	Average depth well (ft.)	Total cost ($000)	Avg. cost per well ($000)	Avg. cost per ft. ($)	Cost of incremental increase in depth: Added depth	Added cost	Cost per added ft.
0- 1,250	5,001	4,244	849	28,147	5.6	6.63			
1,251- 2,500	10,219	18,323	1,793	146,368	14.3	7.99	944	8,700	9.22
2,501- 3,750	12,603	39,336	3,121	357,996	28.4	9.10	1,328	14,100	10.62
3,751- 5,000	7,442	31,944	4,292	322,182	43.3	10.09	1,171	14,900	12.72
5,001- 7,500	8,624	52,638	6,104	658,545	76.4	12.51	1,812	33,100	18.27
7,501-10,000	3,496	30,173	8,631	448,441	128.3	14.86	2,527	51,900	20.54
10,001-12,500	1,414	15,671	11,083	326,363	230.8	20.83	2,452	102,500	41.80
12,501-15,000	447	5,981	13,380	162,399	363.3	27.15	2,297	132,500	57.68
Over 15,000	33	529	16,038	21,278	644.8	40.20	2,658	281,500	105.91
Total	49,279	198,839	4,035	2,471,718	50.2	12.43			

Drilling Costs by States

	Wells drilled	Total footage (M. ft.)	Average depth per well (ft.)	Total cost (M. $)	Average cost per well drilled ($)	Cost per foot drilled ($)
DISTRICT 1:						
Florida	30	195	6,500	3,331	111,000	17.08
New York	696	1,007	1,400	4,226	6,100	4.20
Pennsylvania	1,507	2,980	2,000	20,704	13,700	6.95
West Virginia	618	1,675	2,700	14,624	23,700	8.73
Total	2,851	5,857	2,100	42,885	15,000	7.32
DISTRICT 2:						
Illinois	2,165	5,425	2,500	39,490	18,200	7.28
Indiana	1,280	2,102	1,600	17,877	14,000	8.50
Kansas	4,783	16,217	3,400	145,768	30,500	8.99
Kentucky	1,164	2,355	2,000	15,785	13,600	6.70
Michigan	623	1,603	2,600	13,769	22,100	8.59
Nebraska	320	1,656	5,200	13,583	42,400	8.20
North Dakota	270	1,962	7,300	27,143	100,500	13.83
Ohio	1,080	2,274	2,100	13,722	12,700	6.03
Oklahoma	7,593	26,122	3,400	279,816	36,900	10.71
South Dakota	20	103	5,200	1,596	79,800	15.50
Total	19,298	59,819	3,100	568,549	29,500	9.50
DISTRICT 3:						
Alabama	103	541	5,300	3,802	36,900	7.03
Arkansas	573	2,111	3,700	22,552	39,400	10.68
Louisiana (incl. off-shore)	2,828	19,125	6,800	342,026	120,000	17.88
Mississippi	397	2,750	6,900	33,726	85,000	12.26
New Mexico	1,418	8,017	5,700	142,468	100,500	17.77
Texas	17,003	78,645	4,600	939,825	55,300	11.95
Southwest (1 & 4)	2,705	13,245	4,900	149,856	55,400	11.31
Gulf (2 & 3)	2,520	16,361	6,500	200,736	79,700	12.27
East (5 & 6)	808	4,209	5,200	47,728	59,100	11.34
N. Central (7-B & 9)	6,465	21,957	3,400	217,212	33,600	9.89
West (7-C & 8)	3,735	20,318	5,400	293,930	78,700	14.47
Panhandle (10)	770	2,555	3,300	30,363	39,400	11.88
Total	22,322	111,189	5,000	1,484,399	66,500	13.35
DISTRICT 4:						
Colorado	734	3,830	5,200	37,174	50,600	9.71
Montana	421	1,933	4,600	31,424	74,600	16.26
Utah	70	396	5,700	11,461	163,700	28.94
Wyoming	917	4,337	4,700	73,755	80,400	17.01
Total	2,142	10,496	4,900	153,814	71,800	14.65
DISTRICT 5:						
California	2,578	11,355	4,400	220,818	85,700	19.45
MISCELLANEOUS	88	123	1,400	1,253	14,200	10.19
Total U. S.	49,279	198,839	4,000	2,471,718	50,200	12.43
Offshore* (incl. in La.)	82	783	9,500	24,499	298,800	31.29

*As reported only.

under widely differing conditions. The other is how much faster the cost curve rises than the depth curve.

In the 7,501-10,000-ft. range, the average cost per well is $128,300 compared to $43,300 for 3,751-5,000 ft., or almost triple. But the depth ratio is only 2 to 1.

The average cost below 15,000 ft. is set at $644,800, or about 15 times as much as for 3,751-5,000 ft., while the depth ratio is less than 4 to 1.

Incremental cost increases . . . The cost of incremental increases in depth also point up strikingly how fast costs increase below 10,000 ft.

You can go from the 0-1,250 to the 1,251-2,500-ft. depth range for only $9.22 per added foot. But the per-foot cost in moving from 7,501-10,000 to 10,001-12,500 ft. is $41.80.

It costs $105.91 per foot to leave the 12,501-15,000-ft. category, where the average is 13,380 ft., and go below 15,000 ft., where the average is 16,038.

Comparative costs . . . Costs per foot vary all over the map—from New York's $4.20, on wells averaging only 1,400 ft., to $28.94 in Utah, where the average is 5,700 ft. deep.

California drilling is the most expensive per foot of the major oil states—$19.45, although the average depth is only 4,400 ft.

Offshore wells, even in 1953, were very expensive. They cost $298,800 per well, or $31.29 per foot for the 82 wells averaging 9,500 ft.

Gas Fight Simmers

● Cities Service tests Kansas authority to fix minimum field prices

WICHITA, Kans.—Can Kansas legally enforce minimum wellhead prices for natural gas?

That question is still up in the air, almost a year after the U. S. Supreme Court knocked out an Oklahoma Corporation Commission order setting minimum prices.

The fight has just been joined by the Southwest Kansas Royalty Owners Association, an organization of more than 2,000 landowners. The group lined up with Magnolia Petroleum Co. and the Kansas Corporation Commission to oppose Cities Service Gas Co. efforts to kill the state order applying to Hugoton field prices.

The test case is Cities Service's suit in U. S. District Court here. The company seeks to recover $1,065,466 in alleged overpayments to Magnolia. The amount is the difference between the old rate of 6 cents per M.c.f. and the 11-cent minimum which became effective January 1, 1954, plus 6 per cent interest.

The royalty owners fear that victory for Cities Service would mean a return to the old 5 and 6 cents per M.c.f. price levels.

The issues . . . The arguments boil down to this:

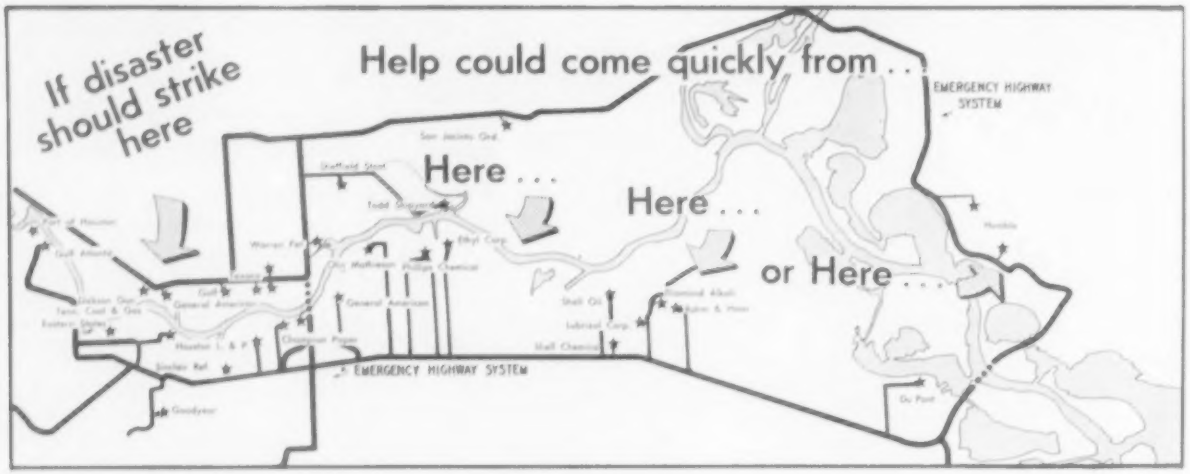
Does the FPC have authority to regulate sales at the wellhead if the gas ultimately reaches interstate commerce?

Cities Service says yes, and cites an interpretation of the Natural Gas Act by the Supreme Court. Kansas says no, and points to the Oklahoma decision which did not specifically mention controlling prices at the wellhead. It said:

"Oklahoma has attempted to fix a minimum price to be paid for natural gas, after its production and gathering has ended, by a company which transports the gas for resale in interstate commerce." The court held that this was illegal, invalidating the minimum price set at 9.8262 cents per M.c.f. *(The Oil and Gas Journal, April 18, 1955, page 104).*

The FPC has ruled recently that it also has authority, under the Supreme Court's ruling in the Phillips case, to regulate wellhead prices if transactions involve resale in interstate commerce.

The issue may not be settled without another Supreme Court decision, or action by Congress spelling out definitely where federal authority begins and ends.


If disaster should strike here
Help could come quickly from . .
Here . . .
Here . . .
or Here . . .
EMERGENCY HIGHWAY SYSTEM
EMERGENCY HIGHWAY SYSTEM

Ship Channel plants band together in hope . . .

. . . Joint Action May Avoid Disasters

HOUSTON.—Oil and petrochemical plants along Houston's sprawling ship channel are getting their dukes up for a disaster—midget or king size.

Sometime next month a message such as this may crackle over a special civil defense radio network:

"Shell Oil Co. Location 268. Assistance Call. Burning oil barge adrift by our docks. Require two portable pumps. Humble, can you provide? Verify. Out."

The message will be heard simultaneously at guard houses at 15 major plants, plus police and civil agencies. All will be alerted. Plants downstream from Shell will stand by in case the barge should drift their way.

Humble officials may feel the burning barge easily could head their direction and thus may need the pumps at their docks. In that case, a Humble dispatcher will radio back:

"Humble to Shell. Require pumps at our docks. Suggest you try Sinclair or Ethyl. Over."

Shell's message then will be repeated to Sinclair or Ethyl. Shell will get the help, because in all 27 industries in the area have pledged their cooperation in emergencies if they don't need the equipment themselves.

It's H.S.C.I.D.A.P. . . . The program is officially titled Houston Ship Channel Industries Disaster Aid Plan and is being set up this month.

Fifteen of the larger companies are installing radio equipment. The Houston Civil Defense office has designated the industrial area as a Civil Defense Zone. Under federal regulations, the CD office has jurisdiction over all operations in case of major disasters.

But CD is interested in disaster teams being trained and able to work smoothly under all types of conditions. It acts as a coordinating agency in setting up the disaster plan and smoothing out the flow equipment and men to plants in trouble. Actual fighting of fires and work in explosions or other emergencies will be done by cooperative workers from all the plants using pooled equipment.

The Houston CD office persuaded the Federal Communications Commission to assign one of the few remaining radio channels to the disaster plan. It also provides the registered companies with immunity from liability during disasters. Thus, a company which registers its vehicles for use in a disaster is absolved from liability for injuries or damage caused by the unit while operating under disaster conditions. The operator of the vehicle or person directing the unit also is given immunity.

GUARDHOUSE RADIO in Phillips Chemical Co. plant is checked by K. M. McDonald, safety director.

How plan works . . . Key to smooth working of the system is the radio network.

To simplify operations, four types of calls have been classified:

. . . Standby alert. This indicates a minor emergency or disaster. Outside assistance is not immediately needed but other companies are alerted to the trouble.

. . . Assistance call. A minor disaster has occurred requiring specific assistance not available at the affected plant. The help may take the form of pumps. In more serious cases, extra fire trucks, foam generators, and hose may be requested.

. . . All out call. This means a major disaster. The plant involved needs all possible assistance—fire equipment, first aid, ambulances.

. . . Atomic alert call. This is given by CD and indicates enemy attack is imminent.

Radio was selected as the most certain means of communications—a vital link in any disaster. Telephone lines were believed too susceptible to being knocked out by fires, explosions, storms.

Equipment used is 60-watt police-car radios broadcasting over the special frequency wave length of 47.54 megacycles. It takes only a receiver, small transmitter, and antenna mounted 40 ft. high to put a company on the circuit. Most sets are being set up in

guardhouses where a 24-hour watch normally is maintained.

The network also is used to transmit weather reports and hurricane warnings. The U. S. Weather Bureau and the CD office jointly obtained a weather radar. Hurricane or tornado reports are sent over the network from the sheriff's department monitor.

Companies tying into the network include Shell, Humble, Phillips, Ethyl, Sinclair Refining, Shell Chemical, Lubrizol, Mathieson Chemical, Gulf Oil, Diamond Alkali, Goodyear Synthetic Rubber, Eastern States Petroleum, Rohm & Haas Chemical. In addition, the U. S. Coast Guard, the Port Commission, Civil Defense, and the sheriff's department are on the frequency.

Fighting tools . . . All registered firms have made available a common arsenal of special equipment.

Besides municipal facilities, here's the equipment which can be thrown into service:

Eight fire trucks, almost 40,000 ft. of hose, 19 portable pumps, 12 portable light units, 33 foam generators, over 350,000 lb. of foam powder, 190 respiratory units, 100 trucks, 10 cranes, 17 tractors and bulldozers, 14 locomotive cranes, 400 ft. of aluminum pipe, 10 miles of 8-in. coupling pipe, a 400-ft. spillboom, and motor boats.

Minimum personnel on call include 5 nurses and 700 firemen, first-aid men, craftsmen, and laborers.

Disaster roads . . . The CD has taken special care to assure the flow of men and equipment to any spot.

It has mapped out major highway arteries over which emergency vehicles will travel. The route will be cleared of all other traffic during times of need. CD mobile radio units will be dispatched to the disaster area to coordinate activities and act as a control tower for traffic.

The special routes are marked in heavy red on maps posted in all plants cooperating in the plan.

Organization . . . The CD office has delegated authority to administer the program to the channel disaster aid group.

It is headed by a zone controller who has three alternates. The controller also heads the disaster aid committee with his subcommittee in each plant.

Each company operates independently—barring a major disaster—and company officials determine if they wish outside help and how much.

But as one company official said: "We're working on a plan we hope we never use. We're going by that old adage, 'The best defense is a good offense.'"

watching WASHINGTON

. . . with Bertram F. Linz

What's par for imports? It changes . . .

NO matter how you look at it, balancing imports against domestic production is a tough proposition.

Mobilization Director Arthur S. Flemming is finding that out. The tight supply of residual fuel oil has caused him to reverse his field. Six months ago he was calling for a cutback in imports. Now he is asking for an increase.

Flemming's trouble is more likely due to supply limitations than to government action. But it shows how demand rather than domestic production can become the important factor.

A year ago the coal industry was fussing that residual imports were stealing their market. The cabinet fuels committee recommended that they be controlled. Flemming asked the importers to cut back.

Whether the importers obeyed—as they didn't in the case of crude oil—or whether they just didn't have residual to bring in, imports fell off. By October Flemming was able to report that not only had they dropped to the level recommended by the cabinet committee but were going to fall 7,000 bbl. daily under the allowable.

Now Flemming is again wrestling with imports. This time he wants them increased. High industrial activity and unusually cold weather have raised demand and supply is tight, he wrote the importers.

He asked the importers to report by today how much additional foreign residual would be required to meet demand over the next 3 months.

Here's an imports problem with no worries . . .

THERE'S an import row going on where the oil industry is sitting on the sidelines. The issue is whether duties on imported barytes ore should be cut.

Years ago the main use of barytes was in making paint. Now drilling mud is a major market.

The Tariff Commission and Committee for Reciprocity Information are studying concessions to be offered at a fourth round of tariff-cutting talks at Geneva this spring. A cut in the barytes duty may be one of those concessions.

Domestic production is in the hands mostly of three or four companies. They are split over the duty. Two of the largest producers say domestic production is inadequate and the duty should be cut to attract more imports. A third takes the opposite view. A few years ago all were lined up against any tinkering with the barytes rate.

Congress will scrutinize the merger trend . . .

CONGRESS may put the brakes on mergers this year. Whether there's enough law to prevent mergers against the public interest but not enough money to enforce it, or more laws and more money are needed is the question before a House committee.

A few important industries, oil among them, have been badly bitten by the merger bug in the past few years. Senator O'Mahoney of Wyoming is talking about "collectivist economic states" in the oil, automobile, and television industries.

The Justice Department and Federal Trade Commission are looking for a remedy. They think it may lie in a law requiring that advance notice be given the Government of all proposed mergers involving companies with assets of $10,000,000 or more.

Ex-Champion Rig Still Has a Punch

CHICKASHA, Okla. — Old drilling rigs never die. They just move to new location.

Take Ohio Oil Co.'s rig now drilling below 8,000 ft. in a deep test in the Bradley area, 15 miles southeast of Chickasha, in Grady County. It spudded in December 3 at the I W. J. Haning, and has been making hole steadily ever since.

However, a little-known fact in the oil country hereabouts is the story of this big rig. It is an ex-champion. It held the world's drilling-depth record until deposed last month by another heavyweight managed by Richardson & Bass in the Louisiana coastal country.

The Ohio rig late in 1953 drilled to 21,482 ft. in the Paloma field 15 miles southwest of Bakersfield, Calif. The exploratory test later was abandoned *(The Oil and Gas Journal, January 17, 1955, page 72)*. That record stood until the Richardson & Bass rig drilled to 22,570 ft.

The Ohio rig, after doing other wildcat jobs in California following its record, was shipped to Oklahoma. Early in its life it wildcatted in Michigan for Ohio.

Petrofina Buying into Panhandle Oil

DALLAS.—Petrofina, the giant Belgian oil firm, is making its first bid for a share of the U. S. oil business in a $6,500,000 deal for one-third interest in an integrated Texas company.

Directors of Panhandle Oil Corp., Dallas, have approved the stock sale to Cie. Financiere Belge des Petroles. But before the transaction can be closed Panhandle shareholders must also approve and Petrofina must be satisfied with an independent appraisal of Panhandle reserves.

Petrofina offered specifically to buy 600,000 shares of Panhandle's authorized but unissued common stock for $11.25 a share. It also would take a 3-year option to buy another 270,000 shares at the same price.

Panhandle now has 1,592,970 shares outstanding of 2,500,000 shares authorized.

The deal would give Petrofina a toe hold in an American company with producing, refining, and marketing facilities.

Panhandle holdings . . . Panhandle currently is producing about 3,100 bbl. of crude daily—the bulk of it from Texas leases. The company at the first of the year owned 430 net oil wells and 20 net gas wells on 33,117 net producing acres. It has wells in all of Texas' major producing areas.

In addition, Panhandle has an 8,000-bbl. daily refinery at Wichita Falls, Tex., and markets through 90 bulk stations and 250 retail stations in North and West Texas and southern Oklahoma. Some of the stations are owned, others leased or controlled.

Panhandle officials indicated that funds from the stock sale will be used primarily to expand company operations.

Octanes Still Rise

● Average of premium, regular grades increases in Ethyl January survey

NEW YORK.—The national weighted-octane average on both regular and premium grades of gasoline moved slightly upward in January, according to the latest survey compiled by Ethyl Corp.

Premium stood at 96.2 research, an increase of 0.1 number from December and 1.9 numbers higher than January 1955. Regular made a 0.3 jump over December and stood at two full research octane numbers over the average of a year ago.

Average tetraethyl lead contents in January were 2.48 ml. per gallon for premium and 2.19 for regular.

Of the 53 cities and marketing centers sampled each month in the Ethyl survey, Buffalo showed the highest average premium rating, with 97.5 research octane number, and Charlotte, N. C., was second with 97.4. Denver continued to show the lowest premium average with 91.4 research octane.

Premium distribution by cities follows:

	Jan. 1956	Dec. 1955	Jan. 1955
90-90.9	0	0	2
91-91.9	1	1	3
92-92.9	0	1	10
93-93.9	5	1	11
94-94.9	7	12	17
95-95.9	14	11	8
96-96.9	14	17	2
97-97.9	12	10	0
Total	53	53	53

Regular grade continues to show a wide spread over the country, with Eastern, Gulf Coast, and Middle Western areas maintaining a margin over other sections. Pittsburgh retained the lead on regular grade for the third month at 91.6.

The 0.3 octane number rise in regular grade average came about mainly from boosts in the upper ranges. Cities showing 91 octane or higher increased from 2 in December to 6 in January.

Regular grade distribution by cities follows:

	Jan. 1956	Dec. 1955	Jan. 1955
82-82.9	1	1	2
83-83.9	0	1	4
84-84.9	1	1	15
85-85.9	3	1	4
86-86.9	14	15	5
87-87.9	3	3	10
88-88.9	8	11	3
89-89.9	10	8	7
90-90.9	7	10	3
91-91.9	6	2	0
Total	53	53	53

Johnson Oil Sold

Refining-marketing firm acquired by Gaseteria

INDIANAPOLIS.—Gaseteria, Inc., a growing midwestern marketer, has more than doubled in size. Last week it acquired the Johnson Oil Refining Co. and with it a refinery, gathering lines, production, and 125 service stations.

Gene L. Williams, Gaseteria vice president, said Johnson properties are now being operated as a subsidiary of Gaseteria. Johnson management and personnel are retained.

Gaseteria acquired stock control of the Johnson property, which is valued at $9 million. Williams said his firm paid $24 a share for the majority of Johnson stock bought and has a standing offer of $24 to remaining stockholders. Johnson had 300,000 shares—250,000 outstanding and 50,000 held in its treasury.

Williams denied reports that Sunray Mid-Continent Oil Co. participated financially in the deal. He said the reports probably arose from the fact that Gaseteria asked Sunray Mid-Continent to furnish engineers to evaluate the Johnson property. Sunray Mid-Continent is one of Gaseteria's big suppliers.

Besides the service stations, the Johnson deal gives Gaseteria 38 bulk stations, 300-400 bbl. daily production, a 450-mile crude gathering system in Oklahoma, and a 6,500-bbl. refinery at Cleveland, Okla., with connections to the Great Lakes Pipe Line system.

Johnson retail outlets are in Illinois, Indiana, Iowa, Oklahoma, and Michigan. Gaseteria already distributes its private-brand products through 51 stations in Indiana, Kentucky, and Illinois, through 37 stations of another subsidiary, Hoosier Petroleum Co., and through 100 associated dealers.

Rain Delays New Refinery

TACOMA, Wash.—U. S. Oil & Refining Co. has begun building a tank farm adjoining the site of its planned 15,000-bbl. refinery here. Heavy rains have stymied work on the refinery itself for a week.

Contractor's plans call for a $6,000,000 complete combination topping and cracking unit with catalytic desulfurizing and reforming units. No decision has been made on specific processes.

Bulk of the crude charged to the refinery probably will come from foreign and Canadian sources. Products from the refinery will be marketed by Time Oil Co. on the West Coast. The plant is scheduled for completion next December.

Refining BRIEFS

MONTREAL.—Imperial Oil, Ltd., will build an 8,000-bbl. per day catalytic reformer at the 51,000-bbl. per day refinery here. The project is part of a $115,000,000 capital-expenditures program announced recently by Imperial, of which $4,500,000 is earmarked for improvement of the Montreal refinery.

The new unit, similar to one now building at Sarnia, will employ a platinum catalyst in a fixed-bed design. Process design is being worked out by Imperial engineers. Fluor Corp. will handle mechanical design and construction. Construction will begin this summer, with completion due early in 1957.

ARKANSAS CITY, Kans.—A new 4,000-bbl. per day Platformer has gone on stream at Anderson Prichard Oil Corp.'s 15,000-bbl. refinery here. The unit was designed, engineered, and licensed by Universal Oil Products Co. It was designed to permit future operation as a Rexformer.

EAST ST. LOUIS, Ill.—A 12,000-daily Sovaformer will be built here at the 42,500-bbl. refinery of Socony Mobil Oil Co., Inc. The unit will include a Sovafining pretreater with a capacity of 16,000 bbl. daily. Fluor Corp. is scheduled to start work on the unit about midyear. It will be completed early in 1957.

ROUSEVILLE, Pa. — Pennzoil Co. will start up a new Platforming-Unifining unit at its 10,000-bbl. daily refinery here this week. The Platformer has a design capacity of 2,000 bbl. per day and the Unifining unit will process naphtha feed for the Platformer and a full boiling range, straightrun gasoline to remove sulfur and other contaminants.

CLARKSON, Ont.—British American Oil Co., Ltd., will add a 10,000-bbl. per day Catforming unit to its 21,500-bbl. per day refinery here. The unit, to be built by Lummus Co. of Canada, Ltd., will be in operation early next year.

TEXAS CITY.—Texas City Refining, Inc., has received a certificate of rapid amortization for the full amount of $1,084,936, the cost of expanding hydrofluoric alkylation capacity from 1,400 to 3,000 bbl. per day. Also included in the certificate was allowance for rapid amortization of 50 per cent of $100,000 for auxiliary facilities.

BAKERSFIELD, Calif. — Bankline Oil Co. has received a certificate to accelerate amortization of $500,000 for a 1,500-bbl. per day alkylation unit at the company's 8,000-bbl. refinery here. Bankline is adding 2,000 bbl. in crude capacity, a 4,000-bbl. per day fluid coker, and a 4,000-bbl. per day Sinclair-Baker catalytic reforming unit.

LINDEN, N. J.—Esso Standard Oil Co. is planning to add a 20,000-bbl. per day catalytic reforming unit to the 170,500-bbl. Bayway refinery here. The unit will be of the fixed-bed type, employing a platinum catalyst, and a process developed by the affiliated Esso Research & Engineering Co. Ground will be broken in a few weeks.

First Barge To Invade California Water

LOS ANGELES.—A floating drilling platform similar to those used in Gulf of Mexico oil operations has been ordered for use in California tidelands exploration. It will be the first use of a drilling barge in this area.

Montgomery Oil Co., Humble Oil & Refining Co., and Seaboard Oil Co. will use the Delong drilling barge on a core-hole exploration of their 1,280-acre lease located a mile offshore from Huntington Beach.

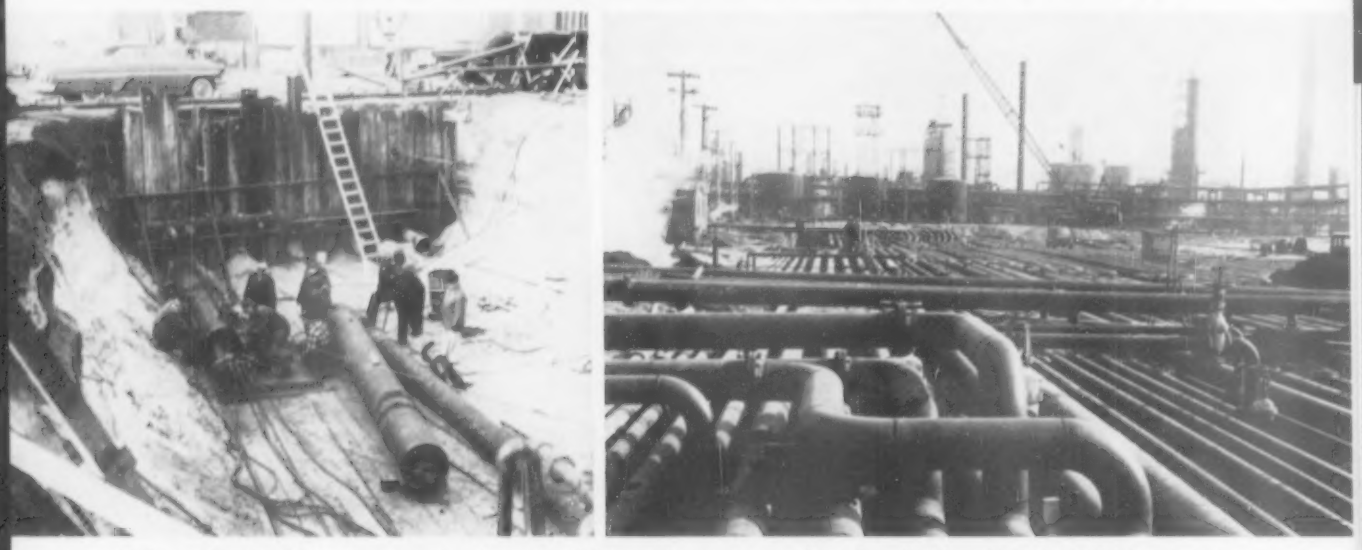
Permission to conduct the core-hole program was granted the group by the California State Lands Commission January 19. The three companies successfully bid on the tidelands parcel last August.

The Delong barge has dimensions of 200 by 100 by 13 ft. and is capable of operating in water depths up to 90 ft. It is being fabricated by a group comprised of Healy Tibbitts Construction Co., Raymond Concrete Pile Co., and Delong Corp.

Monterey currently has three offshore leases under development in Southern California. Drilling has been halted from its island at Seal Beach pending completion of a second deck. The twelfth well on this lease was brought in recently from the filled island.

The company has been plagued with trouble on its 1 State 1549, the first test of its West Newport tidelands lease. The crew currently is fishing for stuck wash pipe. Depth of the hole is 4,400 ft. with drilling from an onshore site. It is the second attempt to drill the test. The first was abandoned at 8,711 ft. because of mechanical difficulties.

Indiana Standard had a fire-ravaged mass of steel on its hands at Whiting . . .



Miles of pipeline were relaid to build up the system that feeds the 220,000-bbl. plant.

New Plant Area Rises From Ashes

CREWS are working through winter snows at Indiana Standard's sprawling Whiting refinery striving to get the plant back into full operation by late spring.

Workmen were on the job immediately after a devastating fire and explosion struck the plant August 27. They have shown amazing speed in putting some units back on stream, shoring up the damage, clearing away debris, and starting the rebuilding program.

Refinery crude throughput by October 20 reached about 60 per cent of 220,000-bbl. capacity. This was stepped up to 84 per cent of capacity by November 7. Since then statistics on throughput have not been released. But company officials report it has been sufficient to satisfy all scheduled requirements.

Work has begun on a 14,000-bbl. per stream day Ultraformer. The unit will partially replace the 27,000-bbl. per calendar day Fluid Hydroformer where the blast and fire centered *(The Oil and Gas Journal, September 5, 1955, page 63)*. Target date for completing the Ultraformer is April. However, delays in shipments of materials for the unit could force a change.

Meanwhile, plans are going forward for additional catalytic reforming facilities. Since they still are in the planning stage, details have not yet been announced.

After the fire had been brought under control last summer, Whiting officials totaled up this general damage as follows:

A ruined Hydroformer; portion of a treating plant heavily damaged; six tanks containing crude, intermediate, and finished products lost; a crude bat-

as it began building an Ultraformer to replace capacity lost in the August fire.

Electrical equipment was repaired . . . and new tanks are going up as part of rehabilitation.

at Whiting

tery slightly damaged; and superficial damage on a catalytic cracking unit.

All refining units were shut down shortly after the explosion as a safety measure. But the plant came back to life quickly.

Telephone communications were partially restored 2 days after the fire. Most of the communications were restored by 4 days later, though some were placed in service on temporary hookup arrangements.

At the crude battery, some of the vapor lines and rundown tanks were damaged. However repairmen had the section into operating condition by the time tankage could be realigned November 21.

Officials decided that two sections of one treating plant destroyed by fire would not be replaced. The duties of the destroyed sections were spread among other treating plants. One section less heavily damaged was returned to service October 10, two others about October 21, and the last on October 25.

Utilities in the fire area also suffured damage. These included four overhead electrical feeders. But they also were repaired or replaced by the time tankage realignment had been completed. No delay was experienced in starting up process units from lack of power feeders.

The greatest problem was replacement and realignment of tankage.

The loss was the primary factor limiting refinery crude throughput. As the burned-out storage tanks were cleared away and new ones put up, the refinery operations stepped up accordingly. By early November, 61 damaged tanks had been dismantled. Work is continuing on replacing the tankage.

In fact, all the cleanup and much of the reconstruction work in the fire damaged area was completed by late December. Crews worked on a three-shift per day basis laying new pipelines, installing equipment, and preparing the site for the new reforming unit.

By the time spring comes, Whiting officials hope little signs of the company's most disastrous fire will remain.

Fuels for War Short

● **Military has trouble now getting enough heavy oil, war would bring crisis especially for jet fuel, NPC warned**

WASHINGTON.—Another war could bring a possible shortage of distillate fuels, the oil industry was warned last week through the National Petroleum Council.

Problems of military supply, both present and future, were dropped in the lap of the NPC at its first 1956 meeting.

The present problem is one of filling heavy fuel needs of the Armed Services Petroleum Purchasing Agency on the West Coast.

The future problem would be triggered by a long war, in which total free world jet fuel requirements alone might be as much as one-sixth of the total requirements for all products.

The military's views and a report on the industry's tank truck capacity were the most important subjects of the meeting.

Other business included reelection of Walter S. Hallanan, president of Plymouth Oil Co., as chairman for his eleventh term, and reelection of R. G. Follis, chairman of Standard Oil Co. of California, as vice chairman. The council also approved a budget of $55,000 for 1956, the same as for last year.

Military short . . . Capt. Carl Dreschler deputy director of ASPPA, revealed what the military faces in getting fuel on the West Coast.

He said his agency had commitments for only 3,000,000 bbl. of the 4,400,000 bbl. of Navy special and 1,500,000 of the 2,500,000 bbl. of Bunker C fuel needed on the West Coast during the first half of the year.

Even this situation is better than a month ago. Then only 1,100,000 bbl. of Navy special was assured, Dreschler said. Later, he expressed confidence that as a result of his appearance before the NPC all requirements would be met.

Dreschler disclosed that he previously had made three attempts to get more offers, including a letter to the president of each company that might be able to furnish heavy fuel and later by personal visits to the companies.

ASPPA's situation is due to the general tightness of heavy fuel on the West Coast, Dreschler explained. He pointed out that stocks in the area have dropped from 30,000,000 to 12,000,000 bbl.

The military purchasing agency also is short nearly 2,000,000 bbl. on its 6-months' requirements for 115-grade aviation gasoline. Total requirements are 14,200,000 bbl. of which only 12,400,000 bbl. is so far assured.

Jet fuel problems . . . The long-term problem of jet fuel was laid before the council by Brig. Gen. Will W. White, staff director of the petroleum logistics division of the Defense Department.

White warned the industry to consider means of meeting expected future needs, particularly of the JP-5 type now coming into use.

Military demand for distillates, now in the area of 300,000 bbl. per day, will increase to some 440,000 bbl. daily by the fiscal year 1965, White forecast.

"This demand seemingly should pose no serious problem as it is less than 15 per cent of the estimated total U. S. 'demand for these fuels," he said. "However, it is not that simple. We have learned from the experiences of the last two world wars that both the essential civilian demand and that of the military must be met."

Demands for jet fuel probably will be one of the greatest problems in the future. Jet engines consume tremendous amounts of fuel, more than 2,500 gal. an hour for some of the larger military planes.

White estimated that jet fuel needs will increase from 231,000 bbl. daily this year to 340,000 bbl. a day by 1956. Civilian requirements will rise in the same period from 12,000 to 70,000 bbl. daily.

These are peacetime requirements, White pointed out. "In wartime, the total free world jet fuel requirements could increase to between 1,000,000 and 2,000,000 bbl. per day, if there were a long-drawn-out conflict in which supersonic jet aircraft were used extensively," he added.

The major fuel now used is JP-4. But the military is working on a heavier JP-5-type fuel which is required for supersonic planes and some supersonic missiles. The Navy also is planning to use such a type fuel aboard aircraft carriers. It has advantages because it can be stored in unprotected tanks and can be mixed with avgas to produce JP-4 types.

"Based on progress to date, there is considerable concern whether the refining industry would have sufficient appropriate processing capacity to produce, under war emergency conditions, the required volumes of this type fuel which would meet the high temperature stability specification limits needed," he commented.

White estimated that peacetime military requirements for the other distillates will not increase to more than 100,000 bbl. per day in the foreseeable future and will not be more than 400,000 bbl. daily in wartime.

Refiners Like Alberta Crude

CALGARY.—Refineries purchasing Alberta crude oil have set a new all-time record in their demands for February with requests totalling 412,702 bbl. daily.

The January allowable rate of production was 389,313 bbl. daily.

For the first time, more than 100,000 bbl. daily will go to the United States if the nominations of refiners are approved. Of this total, 47,500 will go to Anacortes, Wash.; 26,500 to Ferndale, Wash.; 10,345 to Wrenshall, Minn.; 8,000 to Pine Bend, Minn.; and 8,000 to St. Paul, Minn.

Major purchaser, however, is Imperial Oil, Ltd., which asks a daily average of 164,835. Second is Shell Oil Co. with a nomination of 65,300 bbl. daily.

Offshore Bidding Sought

LOS ANGELES.—Four major companies again have asked the State Land Commission to offer tidelands for bonus bidding.

The firms—Union Oil Co. of California, Continental Oil Co., Shell Oil Co., and Superior Oil Co.—asked bidding privileges on 5,500 acres off Orange County.

The same group recently filed a similar request involving 52,000 acres between Point Conception and Ellwood off Santa Barbara County. Superior also has on file an application covering 16,700 acres offshore from the Ventura-Los Angeles county line.

British Columbia Tax Cut

VANCOUVER.—In a move to encourage the search for oil in British Columbia, the provincial government has decided to remit 50 per cent of its sales tax on oil drilling equipment.

The decision is the result of 2 years of negotiations with the Canadian Petroleum Association and the Canadian Association of Oilwell Drilling Contractors.

In making the announcement, Premier A. C. Bennett said: "We want to encourage these companies to drill. We think our oil reserves, when developed, will be the greatest in Canada."

Colorado Law Dies

Conservation measure goes too far, industry asserts

DENVER.—An oil and gas conservation law for Colorado is dead for at least another year.

A state senate committee last week killed a bill which would have given the state Oil and Gas Conservation Commission authority to order reinjection of gas and to control oil production.

The new law was demanded by Gov. Ed C. Johnson because the state Supreme Court last May voided a 1952 commission directive ordering reinjection in the rich Rangely oil field. The commission later withdrew all regulations against flaring of gas in the state. The governor estimated conservation measures would add 80,000,000 bbl. of oil to Rangely's ultimate recovery. The committee chairman, Sen. D. R. C. Brown, said his group decided the need for the bill wasn't "quite as urgent as the governor thinks it is." He added that oil companies and the commission are negotiating an agreement and the committee agreed to give them a year to work it out. The next session of the legislature will be in January 1957.

Industry's view . . . The committee's action followed a public hearing at which the bill was attacked by the industry as giving the Oil and Gas Commission too much power.

Howard Gullickson, representing Shell Oil Co. and the Rocky Mountain Oil and Gas Association, said the commission—under strict interpretation of the bill's provisions—could actually confiscate oil and gas properties.

Warwick M. Downing, chairman of the commission, advocated unitization as the best method of effective conservation. But he denied a contention by Gullickson that the bill would have required compulsory field-wide unitization wherever reinjection was undertaken.

Alabama Offshore Sale Set

MONTGOMERY.— Alabama, with a fledging oil industry and a relatively short coast line, this week will try to cash in on the big offshore oil play.

A large block of land underlying the Gulf of Mexico will be offered for leasing by the Alabama Department of Conservation February 3.

W. H. Drinkard, department director, has invited bids for oil and gas leases on nearly 360,000 acres of state-owned land. The major portion—about 345,000 acres—is submerged by the Gulf of Mexico, Mobile Bay, and Mississippi Sound.

Six smaller tracts covering about 14,270 acres also will be put on the auction block. They include three tracts underlying Perdido Bay, Perdido River, Old River, and various saltwater inlets, and three additional tracts along the Tombigbee River in Clarke and Washington counties.

Drinkard said bids will be accepted for either whole or fractional tracts. Primary term of any leases awarded will be for not more than 5 years.

Canadian Line Pushed

VANCOUVER. — Right-of-way is being cleared along the route of the 650-mile Westcoast Transmission Co., Ltd., pipeline.

Canadian Bechtel, Ltd., project manager on the gas line, reports construction is being speeded up to meet or better the completion deadline for the fall of 1957. The line will run from the Peace River area of northern British Columbia and Alberta to the international border. The 30-in. line will have a capacity of 660 million cubic feet daily.

Dutton-Williams Brothers, Ltd., is clearing right-of-way on the northern section of the line. Bechtel's Pipeline Construction Division has hired a subcontractor, Sovereign Construction & Engineering, Ltd., to clear right-of-way in the Quesnel district. Conyes Construction Corp. is clearing in the vicinity of Kamloops.

Mannix, Ltd., is preparing for river crossings in the Hope area. The firm laid several miles of pipe last fall.

Construction is expected to hit a peak sometime this summer. An estimated 2,000 men will be working on the job. This is about 10 times the present number.

Ceremony Points Up Refining Progress

BATON ROUGE.—A 20-year-old gasoline powered the drill which bored test holes for footings at the $1,500,000 addition to Esso Research Laboratories, a division of Esso Standard Oil Co.

Produced in pilot plants at the Baton Rouge laboratories in the early 1930's by the now-famous catalytic hydrogenation process, the gasoline was symbolic of the scientific advances made by the refining industry in recent years.

The catalytic hydrogenation process, a major factor in supplying the aviation gasoline needed by the Allies in World War II, was developed here under Marion W. Boyer, director of the laboratories at that time. It was a forerunner of modern catalytic processes.

The new addition will provide facilities for about 150 petroleum scientists and technicians at Esso Standard Oil Co.'s Baton Rouge refinery. It will permit centralization of varied research activities conducted here by Esso Research Laboratories.

Shown at the ground-breaking ceremony, standing left to right, are Henry J. Voorhies, Esso vice president and general manager of the Baton Rouge refinery; Boyer, now a member of the board of Standard Oil Co. (N. J.); Alexis Voorhies, Jr., director of the Baton Rouge laboratories; William North, architect; and Eugene Barksdale, contractor. H. H. Dickenson, of Hart-McCowan Foundation Co., is operating the drill.

First-Quarter Imports Estimates Hiked

IMPORTERS have raised their estimates in the past month, according to reports filed with the Texas Railroad Commission.

Actual imports for December exceeded the estimate made a month ago, and the volume now scheduled for the first quarter is up from the total reported last month.

In their reports to the commission in December, importers estimated that their product imports for that month would average 475,000 bbl. daily. Reporting companies now show 569,300 bbl. daily for December. This represents an upward revision of 94,300 bbl. daily or almost 20 per cent.

The difference between estimated and actual imports of crude was very small, a gain of only 8,300 bbl. daily.

The higher level of product imports in December could not have been due to a shift between months since current estimates for the first quarter of 1956 are higher than those reported a month ago. Planned product imports for the first quarter now stand at 450,400 bbl. daily compared with last month's estimate of 447,300 bbl. daily.

Products flow below 1955 . . . Despite the upward revision, product imports for the first quarter will fall below actual volume for the first quarter of 1955.

But, product imports in the first quarter of last year were very high. Companies reporting to the Texas Railroad Commission brought in 15.8 per cent more products in the first quarter of 1955 than in the same quarter of 1954. Actual imports of all products showed a gain of 28.6 per cent for the same quarters.

The current report carries final 1955 figures for all companies that file with the commission. Crude imports by these companies averaged 16.6 per cent more than in 1954. Product imports gained 10.8 per cent.

Crude imported by the companies reporting to the commission represented 97.2 per cent of all crude imports tabulated by the Bureau of Mines in the first 10 months of the year. Product imports by these same companies accounted for only 78.6 per cent of the total.

Crude imports up . . . For the first 5 months of 1956, company estimates of planned imports show a gain of 15.7 per cent for crude. A decrease of 5.9 per cent is estimated for products, compared with the same period of 1955.

CRUDE IMPORTS*
(Thousands of barrels daily)

	1954	1955	Per cent change
First three quarters	639.9	740.4	15.7
October	656.1	795.2	21.2
November	626.0	766.0	22.4
December	720.2	823.2	14.3
Fourth quarter	667.9	795.1	19.0
Year	647.0	754.2	16.6

	1955	1956	Per cent change
January	716.8	787.5	9.9
February	747.3	789.8	5.7
March	721.4	857.8	18.9
First quarter	727.9	812.2	11.6
April	669.4	838.4	25.2
May	721.7	861.7	19.4

PRODUCT IMPORTS*
(Thousands of barrels daily)

	1954	1955	Per cent change
First three quarters	314.5	359.6	14.3
October	328.2	287.1	—12.5
November	414.2	402.5	— 2.8
December	485.1	569.3	17.4
Fourth quarter	409.1	419.8	2.6
Year	338.4	374.8	10.8

	1955	1956	Per cent change
January	508.1	492.4	— 3.1
February	519.0	448.6	—13.6
March	451.8	410.2	— 9.2
First quarter	492.0	450.4	— 8.5
April	356.9	346.3	— 3.0
May	327.1	330.6	1.1

*From reports to the Texas Railroad Commission.

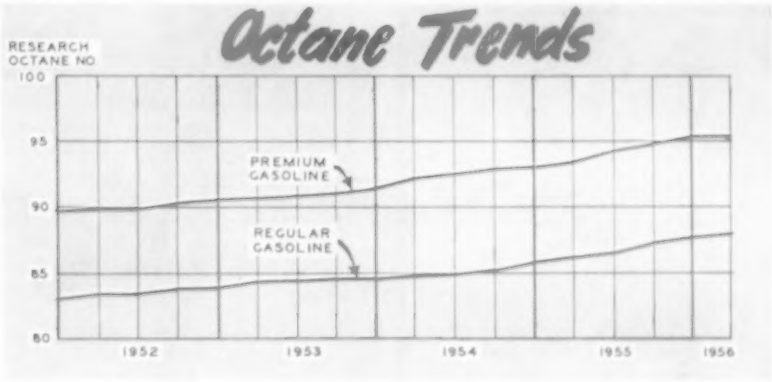
What the Companies Told the Railroad Commission

(Thousands of barrels daily)

	Actual*		Estimated or forecast*				
	Dec. 1954	Dec. 1955	Jan. 1956	Feb. 1956	Mar. 1956	Apr. 1956	May 1956
CRUDE—EAST COAST:							
Atlantic Refining Co.	51.5	59.6	68.7	68.7	68.7	68.7	68.7
Cities Service Co.	15.0	16.4	28.0	12.8	28.3	33.7	34.0
Eastern States Petroleum Co.	0.8	16.9	13.6	21.7	19.5	27.0	27.0
Gulf Oil Corp.	149.0	149.0	131.0	112.0	133.0	130.0	130.0
McBride Oil & Gas Corp.	4.0						
Phillips Petroleum Co.	3.3	18.8	11.6	12.4	11.6	12.0	11.6
Sinclair Oil Corp.	70.8	73.1	68.8	68.8	68.8	71.0	71.0
Shell Oil Co.		1.4	2.2	2.3	2.5	2.6	2.8
Socony Mobil Oil Co., Inc.	83.4	63.0	64.5	64.5	64.5	66.5	66.5
Sohio Petroleum Co.		1.9	1.9	2.1	1.9	2.0	1.9
Southwestern Oil & Refining Co.	7.2	3.6	3.6	3.9	3.6	(¶)	(¶)
Standard Oil Co. of California	64.4	80.8	81.2	81.2	81.2	81.2	81.2
Standard Oil Co. (Ind.)	13.0	16.3	6.6	14.0	13.1	13.5	16.3
Standard Oil Co. (N. J.)†	78.0	85.0	79.0	79.0	79.0	79.0	79.0
Sun Oil Co.	45.7	28.9	18.5	36.7	27.3	27.5	27.3
The Texas Co.	53.2	80.5	60.9	72.7	68.6	38.0	69.4
Tide Water Associated Oil Co.	9.9	15.3	13.7	14.3	21.9	12.5	15.0
Total East Coast	649.2	710.5	653.8	667.1	693.5	668.8	705.3
CRUDE—WEST COAST:							
Shell Oil Co.		23.4	24.5	40.0	40.0	28.0	31.6
Socony Mobil Oil Co., Inc.	16.6	31.7	30.5	26.5	31.5	31.5	31.5
Standard Oil Co. of California	30.8	26.5	17.8	17.8	17.8	17.8	17.8
The Texas Co.	9.5	5.1	10.6	9.5	8.7	34.7	23.6
Tide Water Associated Oil Co.	14.1	26.0	50.3	28.9	66.3	57.6	51.9
Total West Coast	71.0	112.7	133.7	122.7	164.3	169.6	156.4
Total crude	720.2	823.2	787.5	789.8	857.8	838.4	861.7
PRODUCTS:							
Asiatic Petroleum Corp.	2.9	3.5	4.7	4.6	4.6	4.5	4.6
Eastern States Petroleum Co.	21.0	14.2	12.6	10.0	10.0	10.0	10.0
Gulf Oil Corp.	4.0	11.0	3.0	9.0	9.0	7.0	7.0
Shell Caribbean Petroleum Co.‡	169.0	170.0	210.0	165.0	130.0	90.0	80.0
Shell Oil Co.	17.9	21.5	25.7	21.2	21.3	20.3	19.7
Sinclair Oil Corp.	3.8	3.5					
Socony Mobil Oil Co., Inc.	10.4	13.5	4.6	9.8	9.8	9.8	9.8
Standard Oil Co. (Ind.)§	28.1	42.1	41.8	39.0	35.5	26.7	21.5
Standard Oil Co. (N. J.)	228.0	290.0	190.0	190.0	190.0	178.0	178.0
Total products	485.1	569.3	492.4	448.6	410.2	346.3	330.6
Total crude and products	1,205.3	1,392.5	1,279.9	1,238.4	1,268.0	1,184.7	1,192.3
Bonded fuel included‖	63.6	85.6	70.7	77.3	77.4	77.0	76.9

*From company reports to the Texas Railroad Commission. †Based on quarterly estimates. ‡Imported by independent distributors. §Received through suppliers who can furnish either domestic or foreign oil. ¶Unreported by company, but an average of 3,600 bbl. daily included in totals. ‖Mostly duty free for bunkering ships in foreign trade.

Refiners Put More Zip in Regular Gas



Here's What Du Pont Found in 53 Cities

(Octane numbers are by research method, arithmetic averages by cities)

	PREMIUM				REGULAR			
	Octane number			TEL cont. cc./gal.	Octane number			TEL cont. cc./gal.
	Jan. 1955	Oct. 1955	Jan. 1956	Jan. 1956	Jan. 1955	Oct. 1955	Jan. 1956	Jan. 1956
Aberdeen	92.3	93.8	94.0	2.45	84.6	86.4	85.7	1.95
Amarillo	91.6	96.0	96.7	2.40	83.8	86.7	87.4	2.13
Atlanta	95.0	96.8	96.8	2.27	87.0	88.2	89.5	2.25
Bakersfield	92.4	94.3	95.0	2.79	83.4	85.7	86.0	2.04
Baltimore	95.5	97.3	96.8	2.38	90.0	91.0	91.6	2.30
Boston	95.3	96.7	96.8	2.27	89.9	90.6	91.3	2.34
Calgary	89.0	90.9	90.9	2.69	83.4	84.2	84.3	2.54
Casper	90.0	92.1	82.4	1.76	84.1	85.3	85.2	1.34
Charlotte	95.1	96.4	96.8	2.27	87.0	88.4	89.4	2.39
Chicago	82.4	94.8	94.9	2.28	84.7	88.5	89.1	2.20
Cincinnati	93.9	95.3	95.2	1.91	88.2	90.1	90.2	2.02
Cleveland	94.2	95.0	95.3	2.00	89.7	90.3	90.8	1.85
Columbus	94.2	94.8	94.9	2.02	89.3	89.8	90.0	1.86
Corpus Christi	94.4	96.9	97.0	2.77	86.4	87.9	88.6	2.55
Dallas—Fort Worth	95.1	97.2	96.9	2.69	86.2	87.6	88.1	2.56
Davenport		94.1	94.0	2.22		86.4	86.9	2.08
Denver	90.5	91.7	91.8	1.81	83.6	85.2	85.3	1.39
Des Moines		94.0	93.8	2.36		86.2	86.9	2.03
Detroit	94.3	95.1	95.2	2.02	88.7	89.8	90.2	1.71
Edmonton	89.8	91.6	91.3	1.96	83.5	84.9	84.7	1.51
El Paso	93.1	95.6	95.5	2.03	82.2	85.8	86.0	2.09
Great Falls—Billings	92.9	94.0	94.1	1.92	85.3	86.6	86.8	1.94
Houston	94.9	96.8	97.4	2.86	86.7	88.1	88.7	2.59
Indianapolis	93.6	94.9	95.4	1.80	85.1	88.7	88.4	1.49
Jacksonville	95.3	96.5	97.1	2.15	89.6	89.8	90.5	2.29
Kansas City	91.8	94.3	94.2	2.42	84.7	84.3	86.7	2.27
Little Rock	94.6	97.5	97.5	2.67	86.3	89.2	89.0	2.36
Los Angeles	93.9	95.6	95.9	2.23	83.7	86.3	86.0	1.35
Louisville	94.2	96.4	96.7	2.46	86.9	89.1	89.6	2.31
Memphis	94.7	97.0	97.2	2.51	87.5	89.2	89.8	2.04
Milwaukee	94.4	95.2	95.3	2.28	85.4	88.8	89.4	2.42
Minneapolis	92.4	94.4	94.5	2.37	84.7	86.2	86.3	1.91
Montreal	92.5	94.3	94.8	1.64	87.7	88.3	89.5	1.70
Nashville	95.4	97.0	96.9	2.41	87.7	89.1	88.9	2.26
New Orleans	94.8	96.8	96.8	2.65	86.7	88.6	88.9	2.46
New York	94.7	96.8	96.8	2.61	89.9	91.0	91.9	2.56
Omaha	91.7	94.2	94.4	2.44	84.9	86.2	86.4	1.79
Philadelphia	95.1	96.6	96.8	2.31	90.3	90.9	91.6	2.12
Pittsburgh	95.1	96.4	96.8	2.20	90.1	90.9	91.8	2.26
St. Louis	92.2	94.3	94.7	2.15	84.9	86.5	86.9	2.31
Salt Lake City	90.3	92.5	92.5	1.28	81.8	82.4	82.2	1.57
San Francisco	94.2	95.8	96.1	2.52	84.3	87.3	87.0	1.88
Seattle	93.8	95.4	95.9	2.24	84.3	86.6	86.4	1.68
Shreveport	94.6	97.1	97.2	2.79	86.9	88.4	87.7	2.58
Spokane	93.7	95.3	96.0	2.05	84.6	86.8	86.3	1.08
Toronto	92.9	94.7	95.3	2.21	87.7	88.5	88.9	1.58
Tulsa-Oklahoma City	92.1	94.2	94.6	2.41	84.6	86.2	86.8	1.91
Vancouver	92.7	94.2	94.5	1.49	84.1	85.0	85.4	1.15
Wichita	91.2	93.9	93.9	2.16	84.3	86.2	86.3	1.83
Winnipeg	92.6	93.8	92.5	2.31	85.8	86.2	86.5	1.97

REGULAR grades of gasoline made greater advances in octane quality than premium for the last quarter of 1955, according to the quarterly Du Pont survey.

The unweighted average for premium gasoline from 48 cities in the United States and Canada at the start of the year was 95.3 compared with 95.2 in October.

For the same period, regular gasoline moved up from 87.7 octane in October to 88.0 in January for a gain of 0.3 of an octane numbers.

The increase for premium was the smallest October-January gain in over 5 years. Reports from 10 cities showed decreases in average octane numbers.

Little Rock had the highest city average for premium on the January report, 97.5 octane. Calgary was the only city with an average below 91 octane. Denver, with an average of 91.8, was the only city in the U. S. below 92 octane. The top record for an individual sample was from the Dallas-Fort Worth area with a rating of 98.7 octane.

Peak ratings for regular grade were for cities on the East Coast. Baltimore, Boston, New York, Philadelphia, and Pittsburgh all had regular grades averaging between 91 and 91.9. The New York metropolitan area ranked first with an average of 91.9.

The quality distribution pattern for premium differs from that of regular. Most of the cities were bunched near the top of the reported premium octane range with 84 per cent in the upper half. This means that 84 per cent of the cities had premium with octane numbers between 94 and 97.9 with only 16 per cent in the lower half from 90 to 93.9.

Only 56 per cent of the cities reported regular in the top half of the range or between 87 and 91.9 with 44 per cent falling into the lower half from 82 to 86.9. Regular gasoline from 30 per cent of all cities averaged between 86 and 86.9.

The widest spread between premium and regular was in Salt Lake City where premium surpassed regular by 10.3 octane numbers.

GENERAL COMPARISONS*

	Jan. 1954	Jan. 1955	Oct. 1955	Jan. 1956
Premium—				
Research Oct. No.	92.0	93.3	95.2	95.3
TEL content (cc. per gal.)	2.19	2.12	2.47	2.26
Regular—				
Research Oct. No.	84.8	86.1	87.7	88.0
TEL content (cc. per gal.)	1.85	1.78	2.15	2.01

*Unweighted averages of 48 cities or areas.

Kuwait discovery may be . . .

. . . World's Biggest Well

KUWAIT, the little 6,500-sq. mile Persian Gulf shaikhdom which produces well over a million barrels of crude daily and has only had two dry holes, has apparently tapped its richest crude source yet.

According to all unofficial reports Kuwait Oil Co.'s northern wildcat, 1 Raudhatain, could be the most prolific producer in the Middle East.

Neither Gulf Oil Corp. nor British Petroleum Co., Ltd., parent companies of Kuwait Oil, will make any comment on the results of recent tests of the well. In contrast to industry rumors that verge on the fantastic, S.A. Swensrud, Gulf's board chairman, concedes that the well has been completed and that "several sands are being tested." He told the New York security analysts the well "looks very interesting."

Since last April when industry sources said a thick section of the Burgan sands were tested successfully, Gulf officials in this country have described the well as a "tight hole" and have declined to make any comment about it. The productive sands in Kuwait's Burgan field, some 75 miles south of the wildcat, are relatively shallow and ranged from 3,500 to 4,800 ft. There are 137 wells producing from the Burgan sands in Kuwait's largest field.

Industry sources reported last spring that the Raudhatain wildcat was an unusually good producer from the Burgan even by Middle East standards. But it was drilled ahead. In October 1955, Gulf said the well had reached 10,301 ft. and was preparing to test the Zubair sands which are productive across the border in Iraq. The wildcat is only 27 miles south of the Kuwait-Iraq border.

Both Zubair and Rumaila fields are located in the section of Iraq just to the north of Raudhatain. Both produce from about 11,000 ft. Zubair, discovered in 1948, has 28 wells which produce an average 3,000 bbl. daily each. Rumaila, discovered in 1953, has 6 wells which produce an average of 9,600 bbl. daily each. Both fields are operated by Basrah Petroleum Co., Ltd., a subsidiary of Iraq Petroleum Co., Ltd.

The latest industry speculation regarding Raudhatain came from London last week in a report that the well has encountered a deep pay sand 1,500 ft. thick—roughly three times the thickness of the Burgan. There was no official confirmation or denial of the report.

If the well is as good as industry reports indicated, it won't be the first record it set. Raudhatain started setting records before it was spudded in. The 136-ft. rig used to drill the wildcat was skidded a record 99 miles from Ahmadi near Burgan field to its northern location in 40 hours actual traveling time *(The Oil and Gas Journal, October 11, 1954, page 119)*.

Parentis Picks Up

First offshore producer completed in French field

PARENTIS field in southwestern France is now producing about 17,000 bbl. daily with Parentis 11, the first marine drilling operation in Europe, furnishing about 2,200 bbl. of the total.

The overwater well was spudded in July 1955 from a concrete-pile platform 1 mile from the north shore and 1½ miles from the eastern bank of the Lake of Biscarosse *(The Oil and Gas Journal, August 22, 1955, page 108)*. It was completed in the same Dolomite limestone structure from which seven other wells in the field produce.

The production potential of Parentis 11, like that of the discovery well in April 1954, is much greater than its current output, but officials of Esso-Rep (owned 89 per cent of Esso Standard S.A.F.) are curbing output rates to avoid water encroachment in the field. The field's latest producer was tested at the rate of 3,430 bbl. daily through a ⅞-in. choke before it went on production.

Two more wells, both along the south shore of the lake, are now drilling. Parentis 16, a slant-hole well deviated from the shore to the structure under the lake, is now engaged in a fishing job. Parentis 18, to the west of 16, is drilling ahead.

What the New 5-Year Plan Calls For

	1955	1960 goal
Crude production (bbl. daily)	1,400,000	2,686,000
Refinery capacity (bbl. daily)	905,000	1,805,000
Cracking capacity (bbl. daily)	400,000	920,000
Natural-gas output (total M.M.c.f.)	363,700	1,400,000
New gas pipelines (miles)		5,600

Russia Sets New Goals

- Central Committee wants crude production increased 91 per cent, refining capacity doubled by 1960

THE Russian oil industry has some ambitious goals to meet during the Sixth Five-Year Plan (1956-60).

The Central Committee of the Communist party—highest ruling authority in the nation—has ordered the industry to:

. . . Increase oil production 91 per cent, from about 1,400,000 bbl. daily to 2,686,000 bbl. daily.

. . . Increase gas output 288 per cent, from the 1955 total of 363,700,000 M.c.f. to 1,400,000,000 M.c.f.

. . . Double basic refining capacity, with the addition of 900,000 bbl. daily, and more than double cracking capacity with 520,000 bbl. in new construction.

. . . Build 5,600 miles of natural-gas trunk pipelines.

The Central Committee also set other stiff objectives. These called for doubling the output of light products, increasing production of lubricants 80 per cent, raising octanes, stepping up drilling speed sharply, and cutting drilling costs. Still other decrees pointed to increased use of fracturing and secondary recovery, and more emphasis on developing natural-gas reserves.

How close the Soviets will come to these goals remains to be seen. They have just now passed the production target set by Stalin for 1937 *(The Oil and Gas Journal, January 23, page 50).*

If Soviet objectives are achieved, annual production gains during the next 5 years will have to be almost double those reported for the past 5 years. Previous Russian announcements listed daily production at 617,000 bbl. in 1940; 752,000 bbl. in 1950; 842,000 bbl. in 1951; 943,000 bbl. in 1952; 1,057,000 in 1953; and 1,158,000 bbl. in 1954. These figures included both crude oil and the crude equivalent of natural gas.

The gas-production statistics are among the first ever issued by the U.S.S.R. They confirm previous reports that this branch of Russian industry is still in the very early stages of development. The entire production could be handled by one of the big U. S. pipeline systems.

Even so, 1955 was by far the biggest year in history for Soviet natural-gas producers and consumers.

Recovery, drilling goals . . . The new plan calls on the industry to increase the use of secondary recovery and other production techniques to the end that 82 per cent of the oil in place will be recovered.

"The hydraulic-fracture method of developing lightly impregnated strata must be improved and widely employed," the official plan says.

"Average drilling speed must be increased no less than 85 per cent for operational oil and gas wells and 95 per cent for exploratory wells. Cost of drilling work must be reduced by 30 per cent. New and improved methods of exploration must be found and more efficient test equipment developed."

Higher-quality tractor and automobile fuels and oils were demanded, with the accent on boosting octanes and reducing the sulfur and paraffin content of diesel fuel. This would entail major modernization programs at existing refineries because much of the capacity is considered obsolete.

Lower unit costs and faster refinery construction rates were urged because the gap between production and processing capacity is growing wider. If the new plan goals were reached by 1960, production would outstrip capacity almost 900,000 bbl. daily.

Production shift . . . The new program clearly points out the shift in emphasis from the old Caucasus fields, particularly the Baku area of Azerbaijan, to regions farther north and east. Already production in these northern and eastern fields represents 58 per cent of the U.S.S.R. total, and the proportion will continue to rise steeply.

Early in the postwar period Azerbaijan accounted for the bulk of Russia's oil production. But by 1960, it's supposed to produce 313,000 bbl. daily, which would be less than 12 per cent of the projected total. Natural-gas output from this region is proposed to be 123.6 billion cubic feet in 1960.

Gas fields and pipelines . . . Russia hopes to increase natural-gas reserves 85 to 90 per cent. Emphasis will be on development of Stavropol field in the northern Caucasus, Shebelinka field in eastern Ukraine, and Stepnov field. Berezovo field across the Ural Mountains in northwestern Siberia will be prepared for development during the period.

The major natural-gas pipelines scheduled to be completed and operating by 1960 include Stavropol-Moscow, Dashava-Minsk-Leningrad, Stavropol-Nevinnomyssk-Mineralnye Vody-Grozny, Shebelinka-Kharkov-Kursk-Orel-Bryansk, and Kazan-Gorky.

Before the end of 1960, two other major gas lines are to be started—from Berezovo to Sverdlovsk and from Grozny to Tbilisi.

China Reveals '55 Figures

Communist China claims that its oil production reached approximately 36,000 bbl. per day during 1955.

Red China did not disclose specific figures. But a government announcement said oil output last year was "2.2 times as high as in 1952." It said that "a producing capacity of nearly 1 million metric tons of oil has been added to the nation's economy during the past 3 years."

This adds up to roughly 1,800,000 metric tons for 1955, which would be about 36,000 bbl. daily.

Philippine Deal Closed

The Philippine Government has granted Standard-Vacuum Oil Co. eight exploration concessions totalling 388,350 hectares (about 959,500 acres) in the Cagayan Valley of northern Luzon.

The concessions are for an initial 4-year term with two extensions of 3 years each possible. They may be converted to development concessions if oil is found by surrendering half the acreage to the government.

In addition to the exploratory program, Stanvac is negotiating with the government for the construction of a refinery in the Philippines. Stanvac would like to build a 21,000-bbl. daily refinery in the islands.

Giant Refinery Ordered

Kuwait plans world's biggest plant expansion project in bid for large share of lucrative fuel oil market

THE largest single addition to crude throughput capacity ever made in the history of the world's refining industry will start this year when Kuwait's 30,000-bbl. refinery at Mena al Ahmadi is boosted to 190,000 bbl. daily.

Kuwait Oil Co., Ltd., owned jointly by British Petroleum Co. and Gulf Oil Corp., last week disclosed plans for the mammoth expansion of the Persian Gulf refinery. Work will begin in the second half of this year and will be completed by the end of 1957.

WORLD'S BIGGEST REFINERIES

Company and location—	Capacity, bbl./day
1. Iranian Oil Ref. Co., Abadan, Iran	585,000
2. Lago Oil & Transp., Aruba, N.W.I.	440,000
3. Esso Standard, Baton Rouge	327,000
4. Humble, Baytown, Tex.	309,000
5. Gulf Oil, Port Arthur, Tex.	272,000
6. Standard (Ind.), Whiting, Ind.	220,000
7. Gulf Oil, Philadelphia	216,000
8. Texas Co., Port Arthur	210,000
9. N.V. de Bataafsche Pet., Pernis, Netherlands	200,000
N.V. Curacaosche Pet. Ind., Curacao, N.W.I.	200,000
Magnolia Pet., Beaumont, Tex.	200,000
12. Arabian American, Ras Tanura, Saudi Arabia	189,000
13. Bahrain Pet., Awali, Bahrain	186,500
14. Standard of Calif., Richmond, Calif.	181,500
15. Creole Pet. Corp., Amuay Bay, Venezuela*	178,000

*Atmospheric distillation unit of 100,000 bbl. capacity now being built.

The expansion will increase Middle East refining capacity to 1,432,800 bbl. daily. The project will make the Mena al Ahmadi second only to the Abadan refinery in Iran in crude capacity. The Abadan refinery has a crude capacity of 585,000 bbl. daily, but is now operating at only 183,000 bbl. daily.

Object is fuel oil . . . In its announcement of the construction project, Kuwait Oil said only that its purpose was to produce more middle distillates, marine diesel, and residual fuel oil, including bunker fuel for tankers loading at Kuwait.

The tanker-loading terminal at Mena al Ahmadi is the world's largest and handles more than a million barrels of crude daily.

It has facilities to load eight supertankers at one time. But because of the small throughput at its refinery, Kuwait has never been able to supply more than a small fraction of the bunker fuel demand for the visiting tankers. Most of the ships have made long trips by the time they reach Kuwait and need fuel. They have been forced to bunker at Ras Tanura or Aden.

The expansion program will include:

. . . Two 80,000-bbl. per-stream-day atmospheric crude distillation units with gasoline stabilizers for each.

. . . Storage capacity for both crude and products with the necessary interconnecting pipelines, pumps and other equipment.

. . . Increased power, steam, and water supply facilities, an oil-water separating plant and distribution lines.

. . . Expansion of the existing oil loading system to the jetty and submarine berths.

Simple plant . . . The present refinery consists of crude distillation only. Its only special process facility is an asphalt unit with a capacity of 210 tons.

The two crude distillation units will be designed by E. B. Badger & Sons, Ltd., which built the existing refinery. They will be built by Bechtel International Corp., which will engineer and build all other facilities in connection with the expansion project. George Wimpey & Co., Ltd., will be associated with Bechtel.

Papua Wildcat Blows Out

AFTER drilling 10 wells and more than 85,000 ft. in Papua in the last 20 years without any commercial oil, two companies have found a "substantial gas flow" at less than 1,000 ft. in their latest well, Kuru 1.

Gas encountered at 998 ft. is escaping to the surface behind 18⅝-in. surface casing which was cemented to 449 ft. after the well was spudded January 1. The gas has not ignited, but Myron Kinley, Houston oil-well firefighter, reached the site of the well last week to assist in shutting off the gas flow.

The well is being drilled by Australasian Petroleum Co., Pty., and Island Exploration Co., Pty. The two firms are owned by British Petroleum Co., Ltd., Standard-Vacuum Oil Co., and Australian interests.

Efforts to assemble equipment needed to control the gas flow last week were being hampered by low water in the Sirebi River. Most equipment was being transported in native dugouts. The well is 7 miles from the river. It was spudded in only after 17 months of back-breaking labor building a road through jungle which receives 350 in. of rainfall a year.

Exploration program . . . The two companies have already spent about $36 million exploring the Australian-owned territory.

They plan to spend another $14 million in Papua in 1956 and 1957. The newly intensified exploration program includes plans for two more wildcats and possibly a third. One location has been staked at Morehead, 100 miles west of the Fly River delta and 20 miles from the coast in southwestern Papua. The other is at Barikewa, some 20 miles north of Omati where the companies drilled two dry holes to 14,352 ft. and 10,880 ft.

The last well before the Kuru test was Aramia 1, about 120 miles west of the Omati area. It was spudded in last April and abandoned as dry after extensive tests at a total depth of 6,614 ft. in November.

The 1956-57 exploration program will also include 6,000 sq. miles of geological surveys by aerial photography with detailed surface geological work to be done on four surface structures. One geological party will do shallow core drilling in the lowland area south of the Turama River and the same area will be worked by one gravity and two seismic parties.

The two companies now have a staff of 600 and about 3,700 local employes with headquarters at Port Moresby where additional workshops and store buildings are being erected. The two companies have five rigs in Papua, three National 50's rated up to 7,000 ft., a National 100, and a National 130 capable of drilling below 12,000 ft.

FIGURES FOR PLANNING

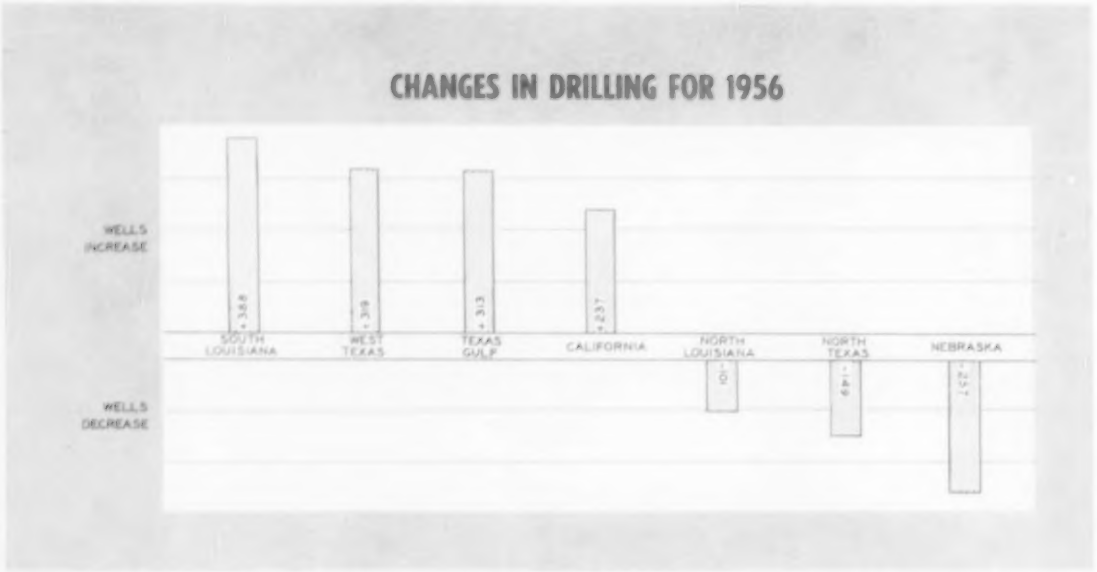
58,062 wells during 1956
36.9 billion barrels total liquid reserves

Here's a quick picture as 1956 gets into stride, as shown in this Review-Forecast issue of the Journal

	YEAR 1955	YEAR 1956	CHANGE FROM 1955	
			AMOUNT	PCT
TOTAL COMPLETIONS	56,682	58,062	1,380	2.4
WILDCAT COMPLETIONS	12,271	13,159	888	7.2
TOTAL FOOTAGE	226,270,000	235,720,000	9,450,000	4.2
CRUDE PRODUCTION	6,777,000	7,072,000	295,000	4.4
CRUDE RESERVES*	30,735	31,491	756	2.5
GAS-LIQUIDS PRODUCTION	721,000	765,000	44,000	6.1
GAS-LIQUIDS RESERVES*	5,244	5,389	145	2.8
GAS RESERVES*	211,711,000	213,792,000	2,081,000	1.0
CRUDE IMPORTS	782,000	842,000	60,000	7.7
PRODUCT IMPORTS	464,000	485,000	21,00	4.5
REFINERY RUNS	7,473,000	7,816,000	343,000	4.6
TOTAL DEMAND	8,746,000	9,074,000	328,000	3.8
DOMESTIC DEMAND	8,375,000	8,752,000	377,000	4.5
CAPITAL EXPENDITURES	4,647,000,000	5,676,000,000	1,029,000,000	22.1

*First of year, millions

. . . Now turn to the detailed facts and figures



Footage gain will be larger than total-well gain, as . . .

Industry Projects 58,062 Wells for '56

by John C. Casper

REPORTS from operators in every active area in the United States and Canada indicate a shift in drilling toward deeper areas and a higher percentage of wildcats in 1956.

Since both of these factors tend to add to average depth of wells for the year, the gain in footage for 1956 will be larger than the gain in wells drilled.

Total drilling for the year is forecast at 58,062 wells compared with 56,682 in 1955. This gain of 1,380 wells represents a relative increase of 2.4 per cent compared with abnormal gains of 5.1 per cent in 1955, 9.4 per cent in 1954, and 7.5 per cent in 1953.

Some operators explained the smaller percentage gains in terms of budgeted expenditures for drilling. The relative increase in the amount of money allocated for drilling this year will be larger than the actual gain in wells drilled.

Again, this is due to the shift toward deeper wells and a higher percentage of wildcats. Out of a total increase of 1,380 wells forecast for 1956, 888 will result from stepped-up exploratory drilling and only 492 will represent additional field wells.

Since average depth of all wildcat wells drilled in 1955 was 4,805 ft. compared with 3,767 ft. for development wells, the program calling for a larger percentage of wildcats will tend to increase the average cost and footage per well.

Also, some of the outstanding gains in completions for 1956 are scheduled for areas where deep drilling is prevalent. The largest gain for this year is forecast for South Louisiana where the average well last year was 10,074 ft. deep compared with a national average of 3,992. Other deep areas with good gains scheduled are Texas Gulf Coast, West Texas, and California.

These trends, shown by reports of drilling scheduled for this year, are the basis for a forecast of 235,720,000 ft. of hole for 1956. This represents a gain of 9,450,000 ft. or 4.2 per cent over the total drilled in 1955. Total footage for 1956 is equivalent in distance to about 5.6 holes through the earth at the equator.

Total reports received from all operators in the survey showed a gain in wells for 1956 of slightly less than 3.0 per cent. The difference between this gain and the weighted increase of 2.4 per cent for the final forecast was due to more returns from operators drilling in those areas with increased activity scheduled for this year.

A decided trend toward expanded exploratory work this year is indicated for Texas and Oklahoma. Every district in Texas is scheduled for a gain in wildcatting for 1956, but only the Gulf Coast and West Texas show increases in development work. A small decrease is forecast for total drilling in Oklahoma with the loss in field wells more than offsetting the good gain projected for wildcats.

California is the only important area with most of its gain in development drilling. Operators reported a decided drop in wells planned for Nebraska, both wildcat and development. However, a few discoveries early in the year could change the picture.

Forecasts for states with little or no production have been based on reported plans for these areas. Again, a good discovery in any of these states would result in more wells than the totals indicated in the forecast. In the case of Alabama, some allowance has been made for the over-all increased interest in Alabama as more important oil state.

Details by states are shown in the large table, and the position of large operators in the forecast is presented in the small tabulation.

Note on the small chart that the crude-production index is still above the drilling index for 1956.

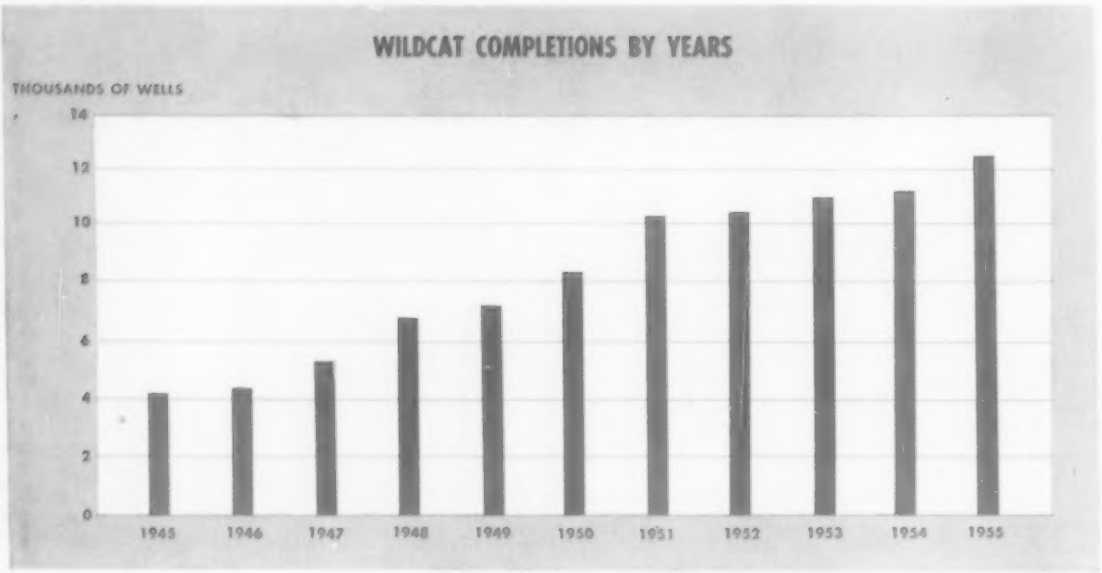
Drilling Forecast for 1956, by Areas

	1956 Forecast				Change from 1955 actual			
	Wildcat wells	Field wells	Total wells	Total footage	Wildcat wells	Field wells	Total wells	Total footage
Alabama	54	28	82	381,000	14	27	41	181,000
Arkansas	220	620	840	2,747,000	10	26	36	118,000
California	537	2,165	2,702	13,916,000	7	230	237	1,192,000
Colorado	775	704	1,479	7,944,000	— 36	6	— 30	— 159,000
Florida	20		20	129,000	— 9	— 1	— 10	— 70,000
Idaho	6		6	18,000	— 3		— 3	— 1,000
Illinois	696	3,295	3,991	9,525,000	61	38	99	222,000
Indiana	287	402	689	1,070,000	26	— 43	— 17	— 33,000
Kansas	1,108	3,995	5,103	18,143,000	90	55	145	546,000
Kentucky	382	1,175	1,557	2,321,000	— 17	— 18	— 35	— 51,000
Louisiana	**840**	**3,466**	**4,306**	**29,830,000**	**145**	**142**	**287**	**3,745,000**
North	254	1,716	1,970	6,211,000	12	—113	—101	— 249,000
South	586	1,750	2,336	23,619,000	133	255	388	3,994,000
Michigan	197	280	477	1,418,000	— 15	— 20	— 35	— 104,000
Mississippi	191	288	479	3,572,000	9	22	31	233,000
Montana	161	269	430	2,018,000	— 11	30	19	90,000
Nebraska	301	333	634	3,552,000	—114	—143	—257	—1,444,000
Nevada	5	1	6	32,000	— 5	— 2	— 7	— 36,000
New Mexico	212	1,490	1,702	7,285,000	54	— 15	39	239,000
New York	5	382	387	582,000	— 1	10	9	9,000
North Dakota	71	198	269	1,916,000	2	17	19	142,000
Ohio	28	1,276	1,304	2,736,000	1	44	45	94,000
Oklahoma	960	7,398	8,358	27,500,000	128	—181	— 53	32,000
Pennsylvania	24	880	904	1,918,000	8	179	187	101,000
South Dakota	18		18	73,000	2		2	9,000
Texas	**5,605**	**14,844**	**20,449**	**89,673,000**	**481**	**— 13**	**468**	**3,689,000**
Dists. 1 and 4	1,062	2,012	3,074	11,889,000	80	—101	— 21	83,000
Dists. 2 and 3	1,009	1,810	2,819	18,100,000	148	165	313	2,066,000
Dists. 5 and 6	403	573	976	4,855,000	36	— 44	— 8	— 29,000
Dists. 7-B and 9	2,035	5,249	7,284	22,576,000	25	—174	—149	— 405,000
Dists. 7-C and 8	995	4,232	5,227	28,344,000	156	163	319	1,785,000
Dist. 10	101	968	1,069	3,909,000	36	— 22	14	189,000
Utah	106	33	139	600,000	35	12	47	203,000
Washington-Oregon	13		13	68,000	1		1	5,000
West Virginia	38	623	661	1,667,000	8	13	21	63,000
Wyoming	281	743	1,024	5,014,000	19	90	109	529,000
Miscellaneous	18	15	33	72,000	— 2	— 13	— 15	— 30,000
Total United States	**13,159**	**44,903**	**58,062**	**235,720,000**	**888**	**492**	**1,380**	**9,450,000**
Western Canada	**790**	**2,190**	**2,980**	**12,985,000**	**28**	**73**	**101**	**520,000**

POSITION OF LARGE OPERATORS IN 1956 FORECAST

	30 Large operators	All other operators	Total
1955 Actual—			
Total wells drilled	12,204	44,478	56,682
Per cent of total wells	21.5	78.5	100.0
Total wildcats drilled	2,042	10,229	12,271
Per cent of total wildcats	16.6	83.4	100.0
Ratio of wildcats to total, per cent	16.7	23.0	21.6
Total field wells drilled	10,162	34,249	44,411
Per cent of field wells	22.9	77.1	100.0
1956 Forecast—			
Total wells to be drilled	12,477	45,585	58,062
Per cent of total wells	21.5	78.5	100.0
Total wildcats to be drilled	2,195	10,964	13,159
Per cent of total wildcats	16.7	83.3	100.0
Ratio of wildcats to total, per cent	17.6	24.1	22.7
Total field wells to be drilled	10,282	34,621	44,903
Per cent of field wells	22.9	77.1	100.0

INDEXES OF DRILLING AND PRODUCTION



Another exploratory drilling record set as . . .

Industry Completes 12,271 Wildcats in '55

by John C. McCaslin

EXPLORATORY drilling in 1955 was expanded to new record levels with the industry recording 12,271 wildcat completions, up about 8 per cent over the previous year's high.

Wildcat wells accounted for 21.6 per cent of all wells completed, up over the previous year when the ratio of wildcat drilling to total wells completed was 20.9 per cent.

The industry set a record-breaking exploratory footage aggregate in 1955. Wildcat footage soared to 58,958,356 ft. as compared with 54,502,000 ft. in 1954. The average depth of wildcat wells in 1955 was 4,804 ft. compared to 4,831 ft. in 1954; 4,714 ft. in 1953; and 4,511 ft. in 1952.

Texas retained its usual lead in wildcat footage in 1955 . . . 25,577,357 ft. But wildcat completions were down in the Lone Star State. Wildcat footage in Louisiana totaled 6,597,752 ft. Louisiana has the best success ratio in wildcat drilling . . . 28.1 per cent were new oil fields, and 4.7 per cent were new gas fields. Oklahoma wildcat footage was down slightly from the previous year at 3,515,175 ft. Kansas drillers made 4,053,837 ft. of wildcat hole in 1955 compared to 3,196,000 ft. in 1954.

Colorado led the Rocky Mountain province in wildcat drilling. That state reported 4,333,015 ft. of wildcat footage compared to 3,600,000 in 1954. Wildcat completions in Colorado hit 811, compared to 657 in 1954.

Of the total wildcats drilled in 1955, 1,812 were completed as new oil producers, compared to 1,598 in 1954. There were 353 new gas discoveries, compared to 399 in 1954; and 10,106 dry holes, compared to 9,283 in 1954. These figures include not only new field discoveries, but also those tests which established new pay zones in older areas, or extended productive areas of existing fields.

Fourteen states reported increases in wildcat activity in 1955. They were: Arkansas, Colorado, Illinois, Indiana, Kansas, Kentucky, Louisiana, Mississippi, Montana, Nebraska, Nevada, New Mexico, Ohio, and Utah.

Louisiana showed a considerable gain over the

U. S. EXPLORATION RESULTS IN 1955

	Total wildcats	Per cent Oil	Per cent Gas	Per cent Dry
Texas	5,124	17.2	2.6	80.2
Oklahoma	832	18.5	3.7	77.8
Kansas	1,018	13.3	3.3	83.4
Colorado	811	6.7	2.8	90.5
California	530	8.5	2.6	88.9
Louisiana	695	28.1	4.7	67.2
Illinois	635	11.7	0.9	87.4
Wyoming	262	9.9	3.4	86.7
Michigan	212	5.7	0.9	93.4
Indiana	261	4.2	0.0	95.8
Nebraska	415	10.4	0.2	89.4
Mississippi	182	7.7	0.0	92.3
Kentucky	399	13.3	3.0	83.7
All others	895	12.6	6.3	81.1
Total 1955	**12,271**	**14.8**	**2.9**	**82.3**
Total 1954	11,280	14.2	3.5	82.3
Total 1953	11,062	14.2	3.3	82.5
Total 1952	10,552	14.1	2.5	83.4
Total 1951	10,302	14.8	2.5	82.7

previous year. New offshore fields and heavy exploratory drilling in the Mississippi River Delta region, as well as in southwestern parishes, coupled with continued active drilling in northern areas, accounted for the increase in exploratory wells.

Rockies Continue 6-Year Pace

The Rocky Mountain states have shown phenomenal exploratory drilling increases in the past 6 years. Colorado continued its usual wildcat-total lead. The Denver-Julesburg basin of northeastern Colorado and western Nebraska was once again the busiest area in the province. Wildcat completions in Nebraska hit 415, compared to 185 in 1954. Forty-four of the 1955 wildcats were successful.

The western slopes of the Colorado Rockies added to the Rocky Mountain wildcat tally considerably in 1955. Eastern Utah and western Colorado saw a busy year of wildcatting, particularly in Grand County, Utah.

The Williston basin reported 69 wildcats in North Dakota, and 16 in South Dakota. One of the South Dakota wildcats opened that state's second oil pool. There were seven new oil pools opened in North Dakota. Montana wildcat completions totaled 172; 15 of these were new oil fields.

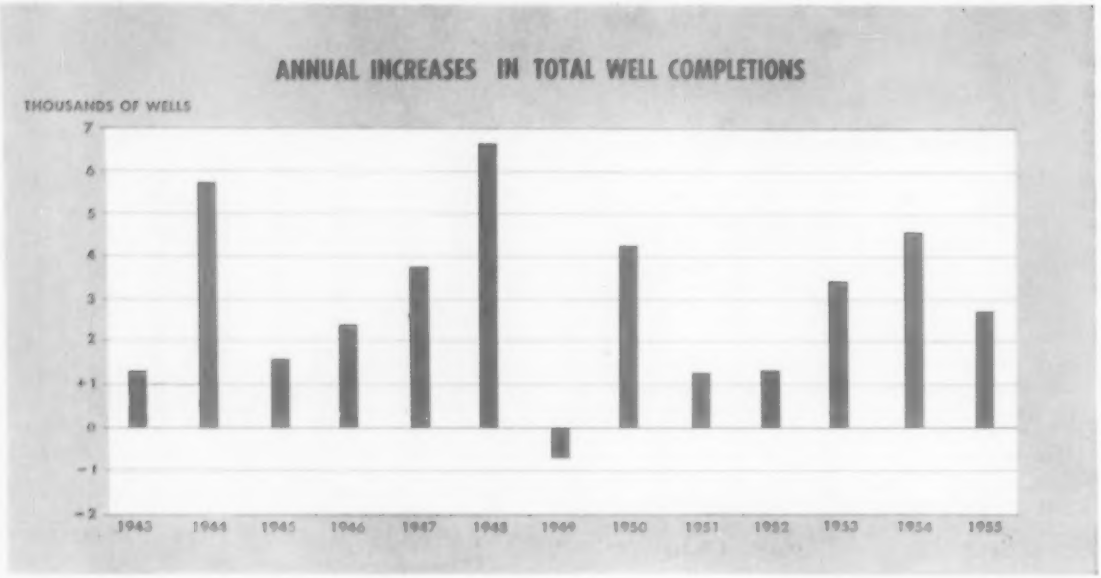
Oklahoma failed to pass the 1954 total in wildcat completions. The Sooner State drilled only 832 exploratory tests compared to 859 in 1954. The heaviest wildcat activity was concentrated in southern and far northwestern counties. Kansas explorers opened 135 new oil pools and 34 new gas fields in 1955. Total wildcat completions for the year soared to 1,018 compared to 811 in 1954.

TOTAL WILDCAT FOOTAGE—1955

	Feet
Alabama	195,819
Arkansas	775,769
California	3,033,542
Colorado	4,333,015
Florida	187,518
Illinois	1,354,932
Indiana	373,424
Kansas	4,053,837
Kentucky	557,245
Louisiana	6,597,752
Michigan	628,557
Mississippi	1,274,204
Montana	802,896
Nebraska	2,199,126
New Mexico	876,537
New York	25,734
North Dakota	384,016
Ohio	94,324
Oklahoma	3,515,175
Pennsylvania	105,603
South Dakota	64,484
Texas	25,577,357
Utah	307,816
West Virginia	120,249
Wyoming	1,351,169
Miscellaneous	168,256
Total 1955	**58,958,356**
Total 1954	54,502,000
Total 1953	52,146,000

WILDCAT COMPLETIONS BY STATES

State—	Comp.	Oil	Gas	Dry
Alabama	40	1	0	39
Arkansas	210	36	4	170
California	530	45	14	471
Colorado	811	54	23	734
Florida	29	0	0	29
Illinois	635	74	6	555
Indiana	261	11	0	250
Kansas	1,018	135	34	849
Kentucky	399	53	12	334
Louisiana	695	195	33	467
North	242	34	8	200
South	453	161	25	267
Michigan	212	12	2	198
Mississippi	182	14	0	168
Montana	172	15	3	154
Nebraska	415	43	1	371
Nevada	10	0	0	10
New Mexico	158	41	11	106
Northwest	48	8	11	29
Southeast	110	33	0	77
New York	6	0	2	4
North Dakota	69	7	0	62
Ohio	27	5	7	15
Oklahoma	832	154	31	647
Pennsylvania	16	0	7	9
South Dakota	16	1	0	15
Texas	5,124	883	132	4,109
North Central (9)	975	217	16	742
West Central (7-B)	1,035	147	1	887
West (7-C & 8)	839	163	12	664
Panhandle (10)	65	19	9	37
East (5 & 6)	367	30	11	326
Gulf Coast (2)	344	57	20	267
Gulf Coast (3)	517	98	23	396
Southwest (1)	481	53	5	423
Southwest (4)	501	99	35	367
Utah	71	5	8	58
West Virginia	30	0	11	19
Wyoming	262	26	9	227
Miscellaneous	41	2	3	36
Total 1955	**12,271**	**1,812**	**353**	**10,106**
Total 1954	11,280	1,598	399	9,283



Gas wells drop in number in 1955, but . . .

Total Completions 56,682, Up 5.1 Per Cent

by Carl Hoot

TOTAL well completions for the United States in 1955 reached 56,682. This was a gain of 2,752 wells over the previous year, or 5.1 per cent. The total was well over the estimate for the year by drilling companies at the start of 1955, but in line with figures revised by most companies along mid-1955.

Total number of oil wells in 1955 was 31,567, up 1,794 over 1954, for a 6.02 per cent increase.

Gas wells dropped a net of 364 wells in 1955, compared with 1954, for a loss of 9.15 per cent. Total gas wells hit 3,613 for the year, compared with 3,977 wells the previous year.

Dry holes totaled 20,742 for the year, up 1,574 over 1954, or an increase of 8.21 per cent. The over-all success ratio for all wells was 65 per cent. This figure includes gas and oil wells.

Several factors held drilling at a high pace throughout the year. Southern Oklahoma received many surprise discoveries in the Viola and Arbuckle limestones. These were found in old producing areas, in rank wildcat country, and in areas of known complex faulting.

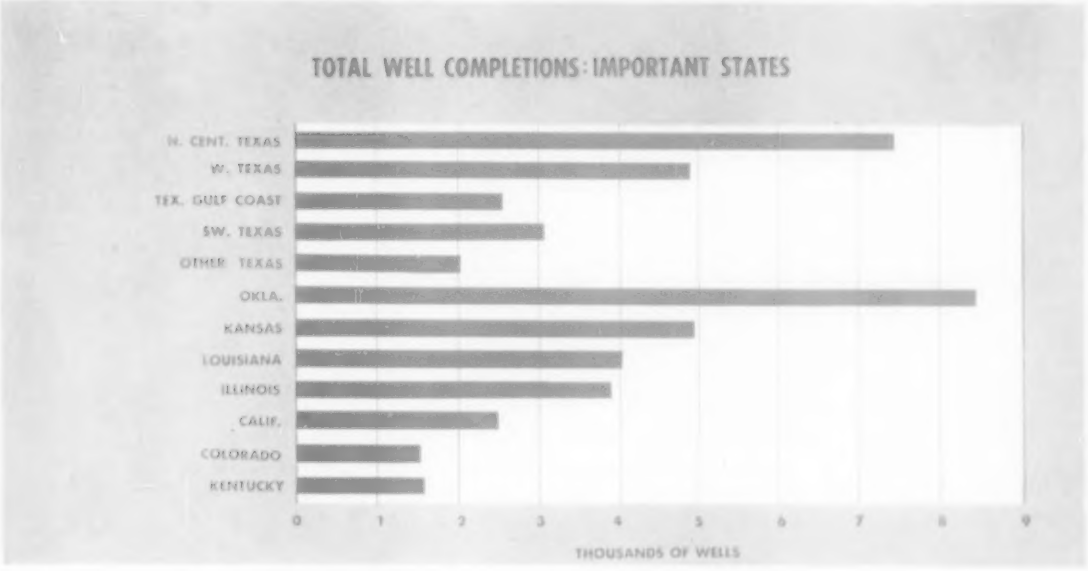
Hugoton Embayment Took On Importance

The Oklahoma and Texas panhandles, geologically comprising the Hugoton embayment, took on added importance during 1955. The main pay objective was the Pennsylvanian, and wildcatting was heaviest in Ochiltree and Beaver counties.

In West Texas fields there was no concentrated exploration or development in any particular area. The entire region enjoyed a successful year, with a good ratio of oil wells to dry holes on the exploration side. The general trend continued toward the deeper pays, from the Wolfcamp on down, but probably for the first time, new Devonian discoveries far outnumbered Ellenburger strikes.

DEVELOPMENT COMPLETIONS BY STATES

	Comp.	Oil	Gas	Dry
Alabama	1	0	0	1
Arkansas	594	393	6	195
California	1,935	1,702	50	183
Colorado	698	348	61	289
Florida	1	0	0	1
Illinois	3,257	2,026	10	1,221
Indiana	445	194	22	229
Kansas	3,940	2,299	328	1,313
Kentucky	1,193	602	150	441
Louisiana	3,324	2,361	249	714
North	1,829	1,383	148	298
South	1,495	978	101	416
Michigan	300	182	17	101
Mississippi	266	166	1	99
Montana	239	155	13	71
Nebraska	476	264	3	209
New Mexico	1,505	818	553	134
Northwest	539	2	512	25
Southeast	966	816	41	109
New York	372	186	0	186
North Dakota	181	158	0	23
Ohio	1,232	636	243	353
Oklahoma	7,579	4,977	328	2,274
Pennsylvania	701	194	284	223
Texas	14,857	11,593	471	2,793
North Central (9)	3,417	2,463	30	924
West Central (7-B)	2,006	1,519	5	482
West (7-C & 8)	4,069	3,749	25	295
Panhandle (10)	990	805	127	58
East (5 & 6)	617	380	84	153
Gulf Coast (2)	479	294	65	120
Gulf Coast (3)	1,166	790	51	325
Southwest (1)	1,293	1,072	9	212
Southwest (4)	820	521	75	224
Utah	21	9	2	10
West Virginia	610	77	432	101
Wyoming	653	413	37	203
Miscellaneous	31	2	0	29
Total 1955	**44,411**	**29,755**	**3,260**	**11,396**
Total 1954	42,650	28,175	3,578	10,897



As the year ended, few West Texas discoveries had the appearance of becoming major fields, but the many strikes added up to a high rate of development drilling.

The year 1955 was a good one for West Texas operators, in Texas Railroad Commission Districts 7-C and 8. But major companies were looking for big discoveries in regions nearby, such as the Hugoton embayment, extreme southern West Texas, and to the Gulf Coast offshore areas.

Rocky Mountain region . . . For the fifth straight year, the Rocky Mountain region made substantial gains in all oil activities over the previous year.

Western Nebraska, where a high rate of drilling began early in 1955, made the most substantial gain of any area of the Rockies. This increase in drilling activity offset a decline in the Clareton area of Wyoming, and gave Nebraska over 18 per cent of the Rocky Mountain operations. In terms of footage drilled, Nebraska was second among Rocky Mountain states.

Northern New Mexico had 13 per cent of the region's completions. This compared with an increase of 9 per cent the previous year. A pickup in drilling over the last half of 1955 gave this region its second best year in its history. New activity is supported by the impending completion of Pacific Northwest Pipe Line which is expected to move San Juan basin gas sometime during 1956.

In Montana, development drilling along the Cedar Creek anticline contributed to the state's drilling record for the year. This work has been made feasible by the addition of an outlet for crude via the Butte pipe line, built jointly by Shell, Murphy, Northern Pacific and other eastern Montana operators. Initial capacity is 30,000 bbl. per day of Williston basin crude.

COMPLETIONS BY MONTHS

Wildcat Completions

	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
Oil	132	138	146	178	134	155	180	165	161	147	146	130
Gas	33	18	34	33	32	27	34	29	32	26	23	32
Dry	762	708	785	849	769	907	871	922	915	901	861	856
Total	**927**	**864**	**965**	**1,060**	**935**	**1,089**	**1,085**	**1,116**	**1,108**	**1,074**	**1,030**	**1,018**

Development Completions

Oil	2,354	2,202	2,592	2,609	2,460	2,643	2,481	2,669	2,585	2,326	2,452	2,382
Gas	228	209	230	247	273	279	283	311	294	295	314	297
Dry	835	796	901	1,026	945	1,027	822	1,063	1,068	953	948	1,012
Total	**3,417**	**3,207**	**3,723**	**3,882**	**3,678**	**3,949**	**3,586**	**4,043**	**3,947**	**3,574**	**3,714**	**3,691**

Total Completions

Oil	2,486	2,340	2,738	2,787	2,594	2,798	2,661	2,834	2,746	2,473	2,598	2,512
Gas	261	227	264	280	305	306	317	340	326	321	337	329
Dry	1,597	1,504	1,686	1,875	1,714	1,934	1,693	1,985	1,983	1,854	1,809	1,868
Total	**4,344**	**4,071**	**4,688**	**4,942**	**4,613**	**5,038**	**4,671**	**5,159**	**5,055**	**4,648**	**4,744**	**4,709**

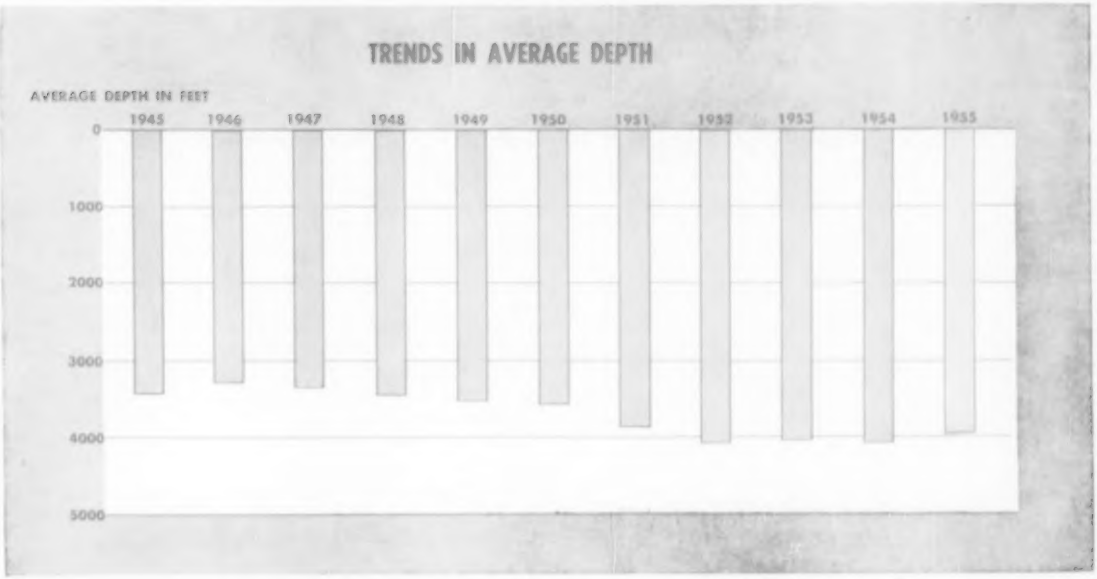
Footage (Thousands of Feet)

Wildcat	4,461	4,211	4,659	5,035	4,728	5,091	5,182	5,315	5,164	5,236	5,168	4,710
Development	13,117	12,480	13,964	14,310	13,749	14,404	13,688	15,137	14,989	13,742	13,850	13,881
Total	**17,578**	**16,691**	**18,623**	**19,345**	**18,477**	**19,495**	**18,870**	**20,452**	**20,153**	**18,978**	**19,018**	**18,591**

Total Completions in United States and Western Canada

	Total comp.	Oil	Gas	Service	Dry	Total footage (1,000 ft.)	Average footage	Comp. 1954
Alabama	41	1	0	0	40	200	4,878	63
Arizona	1	0	1	0	0	6	6,382	2
Arkansas	804	429	10	1	364	2,629	3,270	665
California	2,465	1,747	64	10	644	12,724	5,162	2,353
Colorado	1,509	402	84	0	1,023	8,103	5,370	1,358
Florida	30	0	0	0	30	199	6,638	31
Georgia	2	0	0	0	2	9	4,625	7
Idaho	9	0	1	0	8	19	2,128	1
Illinois	3,892	2,100	16	3	1,773	9,303	2,390	3,135
Indiana	706	205	22	2	477	1,103	1,563	887
Iowa	27	0	0	*27	0	57	2,118	3
Kansas	4,958	2,434	362	13	2,149	17,597	3,549	4,722
Kentucky	1,592	655	162	2	773	2,372	1,490	1,188
Louisiana	4,019	2,556	282	5	1,176	26,085	6,490	3,611
North	2,071	1,417	156	0	498	6,460	3,120	2,010
South	1,948	1,139	126	5	678	19,625	10,074	1,601
Michigan	512	194	19	1	298	1,522	2,973	567
Missouri	1	0	0	0	1	2	1,512	39
Mississippi	448	180	1	0	267	3,339	7,453	441
Montana	411	170	16	0	225	1,928	4,691	343
Nebraska	891	307	4	0	580	4,996	5,607	472
Nevada	13	2	0	0	11	68	5,216	7
New Mexico	1,663	859	564	0	240	7,046	4,237	1,126
Northwest	587	10	523	0	54	2,128	3,626	387
Southeast	1,076	849	41	0	186	4,918	4,641	739
New York	378	186	2	175	15	573	1,460	435
North Dakota	250	165	0	0	85	1,774	7,096	312
Ohio	1,259	641	250	28	340	2,642	2,098	1,182
Oklahoma	8,411	5,131	359	333	2,588	27,532	3,273	8,786
Oregon	7	0	0	0	7	34	4,921	0
Pennsylvania	717	194	291	149	83	1,817	2,534	1,331
South Dakota	16	1	0	0	15	64	4,030	23
Tennessee	17	2	1	0	14	26	1,543	45
Texas	19,981	12,476	603	11	6,891	85,984	4,303	18,865
North Central (9)	4,392	2,680	46	1	1,665	13,000	2,960	4,286
West Central (7-B)	3,041	1,666	6	0	1,369	9,981	3,282	2,852
West (7-C & 8)	4,908	3,912	37	5	954	26,559	5,411	4,431
Panhandle (10)	1,055	824	136	0	95	3,720	3,526	958
East (5 & 6)	984	410	95	0	479	4,884	4,963	1,053
Gulf Coast (2)	823	351	85	0	387	5,099	6,195	841
Gulf Coast (3)	1,683	888	74	3	718	10,935	6,497	1,814
Southwest (1)	1,774	1,125	14	0	635	4,648	2,618	1,181
Southwest (4)	1,321	620	110	2	589	7,158	5,419	1,449
Utah	92	14	10	0	68	397	4,314	91
Washington	5	0	0	0	5	29	5,761	4
West Virginia	640	77	443	0	120	1,605	2,505	614
Wyoming	915	439	46	0	430	4,486	4,901	1,221
Total 1955	**56,682**	**31,567**	**3,613**	**760**	**20,742**	**226,270**	**3,992**	
Total 1954	**53,930**	**29,773**	**3,977**	**1,012**	**19,168**	**218,986**	**4,061**	**53,930**
Total 1953	**49,279**	**25,762**	**3,806**	**1,262**	**18,449**	**198,839**	**4,035**	
Total 1952	**45,821**	**23,466**	**3,255**	**1,482**	**17,618**	**187,190**	**4,085**	
Total 1951	**44,516**	**23,453**	**3,030**	**1,380**	**16,653**	**172,331**	**3,871**	
Total 1950	**43,279**	**24,430**	**2,843**	**1,249**	**14,757**	**159,288**	**3,680**	
Western Canada	2,879	1,990	159	0	730	12,465	4,329	2,201
Alberta	1,590	1,138	129	0	323	8,235	5,171	
Saskatchewan	885	554	17	0	314	3,159	3,603	
Manitoba	362	295	0	0	67	855	2,361	
British Columbia	38	3	12	0	23	207	5,446	
N.W.T.	4	0	1	0	3	9	2,236	

*Gas storage well.



No letup in deep drilling in sight as . . .

Depth Records Are Broken in Sixteen Areas

by John C. McCaslin

PRODUCTION-DEPTH records were broken in nine areas during 1955. Seven areas set drilling-depth records.

The world's deepest producing area is at Weeks Island field in Iberia Parish, South Louisiana. Several wells in this field are producing in the Miocene below 17,500 ft. The Coles Levee field well in Kern County, California, which is not producing, set the all-time producing depth record in 1953 at 17,892 ft. The third deepest producing area in the record colmun is Southeast New Mexico. Continental Oil Co. got gas production from the Devonian at 15,025 ft. at its 1-A Bell Lake Unit in Lea County. West Texas' Glenna gas field in Pecos County is No. 4 on the list with production from the Ellenburger at 15,000 ft.

New records . . . New producing-depth records were set in South Louisiana, Oklahoma, New Mexico, Alabama, the Texas Panhandle, North Louisiana, Montana, and Tennessee.

Oklahoma's new titleholder for deep oil production is Max Pray et al. 2 Billy in the deep Ordovician Bradley area of Grady County. This well flowed oil from the Tulip Creek sand at 14,076 ft. The previous record was in the same area in the 13,000-ft. bracket. Southeast New Mexico has a new oil-producing depth record in addition to its new gas record. It is Sinclair Oil & Gas Co. 1 Dean in Lea County. The well flowed oil from the Devonian at 13,725 ft.

Montana got a new deep oil producer at Sun-Phillips 2 Dynneson in Richland County. This Williston basin well flowed oil from the Ordovician-Red River at 12,654 ft. The previous record was in the same field at 12,605 ft. The biggest discovery of the year in the southeastern states gave Alabama a new producing-depth record. Zach Brooks Drilling Co. 1 Donovan in Mobile County's Citronelle area is producing from the Rodessa at 11,414 ft.

The year's biggest hit in the Texas Panhandle gave that area a new deep well. Phillips 1 Troy "A," Gray County, gave Ellenburger oil production to the Laketon area from 11,370 ft.

Carter Oil Co. 1 Jones-O'Brien Unit in Red Rock

DEPTH CLASSIFICATIONS BY MONTHS

	0-1,250 ft.	1,250-2,500 ft.	2,500-3,750 ft.	3,750-5,000 ft.	5,000-7,500 ft.	7,500-10,000 ft.	10,000-12,500 ft.	12,500-15,000 ft.	15,000+ ft.
January	357	992	1,172	635	680	327	130	45	6
February	318	980	1,009	613	652	303	133	59	4
March	435	1,139	1,129	751	720	313	130	60	11
April	435	1,243	1,302	695	699	358	140	58	12
May	413	1,192	1,078	672	726	327	147	47	11
June	459	1,274	1,337	730	743	305	130	54	6
July	414	1,128	1,200	588	781	339	148	68	5
August	492	1,172	1,506	671	772	339	141	56	10
September	464	1,168	1,436	705	742	339	130	63	8
October	447	1,032	1,150	663	780	366	139	62	9
November	472	1,174	1,194	624	708	351	152	60	9
December	475	1,211	1,166	665	738	281	122	43	8
Total	**5,181**	**13,705**	**14,679**	**8,012**	**8,741**	**3,948**	**1,642**	**675**	**99**

United States Production Depth Records

State or area—	Well and location; county—	Result	Year comp.	Pay zone	Prod. depth
California	Richfield 67-29 Coles Levee; Kern (not producing)	Cond.	1953	Eocene	17,892
Louisiana, South	Humble and Shell's Weeks Island field; Iberia	Oil	1955	Miocene	±17,500
New Mexico, S. E. (Gas)	Continental 1-A Bell Lake Unit, 31-23s-34e; Lea	Gas	1955	Devonian	15,025
West Texas	Phillips 1 Glenna Pool; Pecos	Gas	1953	Ellenburger	15,000
Oklahoma (Gas)	Denver 1 School Land, 16-10n-9w, Cogar field; Caddo	Gas	1948	Hunton	14,510
Mississippi	Union Producing et al. 1 Logan, Tinsley field; Yazoo (not producing)	Cond.	1951	Smackover	14,427
Wyoming	Pure 1 Unit, 11-33n-84w; Natrona	Oil	1948	Frontier	14,307
Oklahoma (Oil)	Max Pray et al. 2 Billy, Bradley area; Grady	Oil	1955	Tulip Creek	14,076
New Mexico, S. E. (Oil)	Sinclair 1 Dean, 35-15s-36e; Lea	Oil	1955	Devonian	13,725
Texas Gulf Coast	Stanolind 1 Sanborn, S. William A-106; Matagorda	Cond.	1954	Frio	13,068
Montana	Sun-Phillips 2 Dynneson, 30-24n-58e; Richland	Oil	1955	Ordovician	12,654
East Texas	Tidewater 1 Ramey Unit, New Hope; Franklin	Cond.	1954	Smackover	12,341
Florida	Humble 1 Gulf Coast, Sunniland field; Collier (now abandoned)	Oil	1943	Glen Rose	11,626
Southwest Texas	Western Natural 14 St. Charles Ranch, Blackjack field; Aransas	Gas	1951	Frio	11,490
Alabama	Zach Brooks 1 Donovan, Citronelle; Mobile	Oil	1955	Rodessa	11,414
Texas Panhandle	Phillips 1 Troy "A," Laketon; Gray	Oil	1955	Ellenburger	11,370
Louisiana, North	Carter 1 Jones-O'Brien Unit, Red Rock; Webster	Oil	1955	Smackover	10,915
North Dakota	Stanolind 1 New Year Many Ribs, Sanish pool; McKenzie	Oil	1954	B. Miss.-U. Dev.	10,674
Utah	Carter 1 Peterson, 13-1s-1w, (USM); Uintah	Oil	1952	Wasatch	10,244
North Texas	Weiner 1 Hazlip, Mineral Creek; Grayson	Cond.	1952	Mulder	10,160
Colorado	Delhi-El Paso 5 Barker, 2-32n-14w; La Plata	Gas	1950	Paradox	9,841
New Mexico, N. W.	Southern Union 9 Barker Creek, 21-32n-14w; San Juan	Gas	1945	Pennsylvanian	9,468
Arkansas	Atlantic 1 McKamie-Patton C-216; Lafayette	Oil	1952	Smackover	9,453
South Dakota	Shell 1 State "A," 9-21n-4e; Harding	Oil	1953	Red River	8,690
West Virginia	Ohio 1 Kuykendall et al., Dry Fork district; Tucker	Gas	1946	Oriskany	8,410
Pennsylvania	American Locomotive 5 Steiner, Unity Twp.; Westmoreland	Gas	1946	Oriskany	8,014
Michigan	Michigan Gulf 1 Bateson, Kawkawlin field; Bay (now abandoned)	Oil	1946	Salina	7,850
Nebraska	Gulf 1 Sisson, 18-21n-58w; Kimball	Oil	1951	Dakota	7,431
Nevada	Shell 1 Unit, 27-8n-57e; Nye	Oil	1954	Volcanics	6,730
Kansas	Stanolind 1 Wall, 35-32s-23w; Clark	Oil	1951	Viola	6,576
Ohio	East Ohio 1 Phillips, Sec. 23, Washington Twp.; Harrison	Gas	1941	Silurian	5,899
New York	Kane 1 Lewis, West Union Twp.; Steuben	Gas	1942	Oriskany	5,228
Kentucky	United Carbon 1 Howe; Pike	Gas	1932	Devonian	5,170
Arizona	Humble 1 Navajo, 4-41n-28e; Apache	Oil	1955	Pennsylvanian	4,816
Illinois	Kingwood 24-A Shanafelt, 20-2n-2e; Marion	Oil	1943	Trenton	4,657
Maryland	Cumberland-Allegheny S-424 Beachy, Ryans Glade 8 Dist.; Garrett	Gas	1949	Oriskany	4,456
Tennessee	Nelson 1 Boos, Bryceville; Anderson	Gas	1955		3,404
Indiana	Lewis 1 Hill, 35-3s-14w; Posey	Oil	1939	McClosky	3,144
Missouri	Cities Service 1 Cook, Tarkio; Atchison	Oil	1944	Bartlesville	1,444

United States Drilling Depth Records

State or area—	Well and location; county—	Result	Year comp.	Deepest formation	Total footage
South Louisiana	Richardson & Bass 1 L.L.F.-Humble "L," 35-19s-27e; Plaquemines	Dlg.			22,559
California	Ohio 72-4 K.C.L.-A, Paloma field; Kern	Dry	1954	Miocene	21,482
Wyoming	Superior 1 Unit, 27-27n-103w; Sublette	Dry	1949	Dakota	20,521
Mississippi	Vasen 1 Fee, 9-2s-11w; Stone	Idle			20,450
Texas Gulf Coast	Magnolia A-417 West Ranch; Jackson (compl. in field pay)	Oil	1955	Jackson	19,060
West Texas	Hunt 47 Elsinore, 21-B-GC&SF; Pecos	Dry	1955	Ellenburger	18,673
Southwest Texas	Superior 27 Welder, Portilla field; San Patricio	Oil	1951		17,966
Oklahoma	Superior 51-11 Weller, 11-8n-12w; Caddo	Dry	1947	Pennsylvanian	17,823
Southeast New Mexico	Richardson & Bass 1 Harrison-Federal, 12-25s-30e; Eddy	Dry	1954	Granite	16,705
East Texas	Humble 1 McWatters, Freestone	Oil	1949	Smackover	16,347
Alabama	Humble 1 Williams, 10-3n-2e; Clark	Oil	1952	Jurassic	15,729
Florida	Gulf 1 State; Monroe	Dry	1947		15,155
Colorado	Mountain Fuel 1 Hiawatha, 14-12n-100w; Moffat	Gas	1952	U. Cretaceous	15,041
North Louisiana	C.V.O.C.-Oliphant 2 Banks, Cotton Valley field; Webster	Dry	1947	Salt	14,967
North Dakota	Amerada 2 Kuam, 19-156n-95w; Williams	Oil	1953	Winnipeg	14,066
North Texas	Humble 1 Williams, D. Yglesias Sur. A-1393; Grayson	Dry	1953		14,363
Texas Panhandle	Gulf 1-E Porter "A," 413-43-H&TC; Lipscomb	Dry	1949	Ellenburger	14,278
Utah	Equity & Pacific Western 1 Unit, 33-21s-21e; Grand	Dry	1949	Pennsylvanian	13,767
Northwest New Mexico	Magnolia 1 Jicarilla "A," 18-23n-2w; Rio Arriba	Gas	1955	Granite	13,590
West Virginia	Hope Nat. Gas 9634; Wood	Dry	1955		13,331
Montana	Sun et al. 1 Beagle Land, 17-23n-59e; Richland	Dry	1954	Winnipeg	13,134
Idaho	Phillips-Utah Southern 1 Juniper, 10-14s-30e; Oneida	Dry	1952		12,844
Arkansas	Shell 1 Browning-Burns Unit, 12-20s-23w; Columbia	Dry	1952	Smackover	12,650
Pennsylvania	The California Co. 1 Bennett; Sullivan	Dry	1951	Siluro-Ord.	12,343
Nevada	Continental-Standard of Calif. 1 Unit, 32-20n-60e; White Pine	Dry	1952		11,543
New York	N. Y. State Nat. Gas Co. 1 Kesselring, Van Etten Twp.; Chemung	Dry	1952	U. Cambrian	11,145
Oregon	Sinclair 1 Federal-Mapleton; Lane	Dlg.	1955		11,058
Michigan	Ohio-Pure 1 Reinhardt, 35-22n-2e; Ogemaw	Dry	1948	Cambro-Ord.	11,012
Washington	Standard of Calif. 1 Alderwood; Snohomish	Dry	1947	Mid. Eocene	11,002
North Carolina	Standard 1 Hatteras Light; Dare	Dry	1946	Granite	10,054
Virginia	The California Co. 1 Kipps Anthracite Coal; Montgomery	Dry	1949	Ordovician	9,936
South Dakota	Shell 1 Homme, 13-20n-12e; Perkins	Dry	1951	Granite	9,348
Nebraska	Stanolind 3 Lovercheck, 21-18n-55w; Banner	Dry	1952	Pre-Cambrian	8,864
Kansas	Stanolind 1 Feathers, 15-35s-33w; Seward	Gas	1947	"Crystalline"	8,243
Maryland	Snee 1 Schartzer; Garrett	Dry	1941	Helderberg	8,165
Ohio	Ohio 1-C Knowlton, Sec. 10, Independence Twp.; Washington	Dry	1933	Clinton	7,889
Illinois	Superior 17 H. C. Ford "C" Lease, New Harmony field; White	Oil	1952	Salem	7,682
Georgia	Stanolind 1 Pullen Land Lot 133, Land Dist. 10; Mitchell	Dry	1944	Triassic	7,487
Arizona	Sinclair 1 Navajo; Coconino	Dry	1952	Granite	7,214
Kentucky	Pure-Ashland 1-A Walker, 22-N-24; Webster	Dry	1949	Knox	6,686
Indiana	Continental 1 Cooper Est., 13-3s-14w; Gibson	Dry	1947	Trenton	6,405

field, Webster Parish, is a new deep well for North Louisiana, producing oil from the Smackover at 10,915 ft. Tennessee's new record is Nelson 1 Boos in Anderson County's Bryceville area. That well is making gas at 3,404 ft.

Drilling-Depth Records

South Louisiana captured another deep-drilling prize in 1955 . . . the world's deepest hole. Richardson & Bass 1 L. L. & E.-Humble "L," 35-19s-27e, Plaquemines Parish, drilled to 22,570 ft. The former record was held by California at Ohio Oil Co. 72-4 Kern County Land in Paloma field, Kern County. That well stopped at 21,482 ft.

Texas has a new deep hole. West Texas has consistently had the deepest wells in the state, but the Gulf Coast passed it in 1955. Magnolia Petroleum Co.'s A-417 West Ranch in Jackson County, went to 19,060 ft., total depth. The well was later completed in the regular field oil pay up the hole. A new West Texas record was set in Pecos County at Hunt 47 Elsinore. This well finished up in the Ellenburger at 18,673 ft.

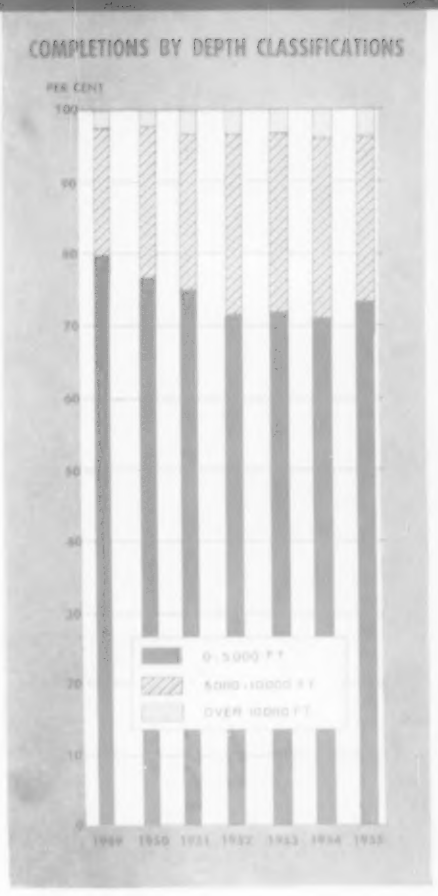
A deep test in the San Juan basin gave northwestern New Mexico a new record. Magnolia's 1 Jicarilla "A," 18-23n-2w, Rio Arriba County, went to 13,590 ft. It was the first test to granite in the area. West Virginia set a new deep-hole record at Hope Natural Gas Co. 9634 in Wood County. The dry hole had a total depth of 13,331 ft., the deepest well in the entire Appalachian province.

Depth Classifications

The Oil and Gas Journal set up a different system of classifying wells by depth in 1955. The new setup counts wells from the 0-1,250-ft. mark, 1,250-2,500 ft., 2,500-3,750 ft., 3,750-5,000 ft., 5,000-7,500 ft., and so on over 15,000 ft. A considerable number of wells (5,181) were completed in the shallow class last year. Two of the biggest contributors were western Kentucky and eastern Oklahoma.

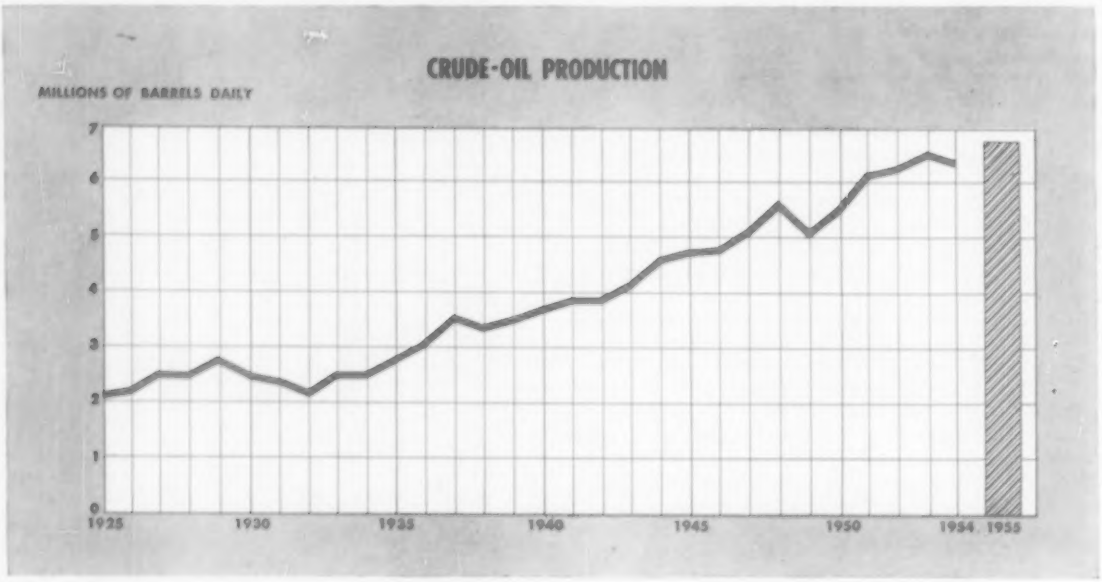
About 28,000 wells were completed in the 1,250-3,750-ft. classes. Operators finaled 8,012 wells in the 3,750-5,000-ft. class. In wells completed from 5,000-7,500 ft. a decrease from the previous year was noted. The deeper classifications all showed important gains. There were 3,948 wells in the 7,500-10,000-ft. class. In 1954 there were 3,838. The industry reported 1,642 wells (1,520 in 1954) in the 10,000-12,500-ft. class; 675 in the 12,500-15,000-ft. class (581 in 1954), and 99 wells went below 15,000 ft. in 1955 compared to 49 in 1954.

Of the 99 wells completed in the 15,000-ft. classification, 70 were in southern Louisiana. West Texas recorded 1 ultra-deep hole; District 4, Southwest Texas had 1, District 2 had 1, and District 3 had 10. One was recorded in Wyoming, and California scored 14.



DEPTH CLASSIFICATIONS—1955

	Under 1,250 ft.	1,250-2,500 ft.	2,500-3,750 ft.	3,750-5,000 ft.	5,000-7,500 ft.	7,500-10,000 ft.	10,000-12,500 ft.	12,500-15,000 ft.	Over 15,000 ft.
Alabama	5	3	5	10	15	1	2	0	0
Arkansas	14	286	324	83	88	9	0	0	0
California	200	343	376	542	498	310	148	34	14
Colorado	10	21	55	339	1,037	45	1	1	0
Florida	0	1	3	10	8	0	6	2	0
Illinois	395	1,351	2,135	10	1	0	0	0	0
Indiana	285	319	102	0	0	0	0	0	0
Kansas	32	449	2,611	1,695	171	0	0	0	0
Kentucky	868	483	202	37	2	0	0	0	0
Louisiana	74	1,333	248	162	452	690	642	348	70
North	68	1,309	202	91	268	98	35	0	0
South	6	24	46	71	184	592	607	348	70
Michigan	40	179	116	116	41	0	0	0	0
Mississippi	4	5	5	40	238	70	77	8	1
Montana	4	99	103	64	60	75	4	2	0
Nebraska	2	8	54	120	707	0	0	0	0
New Mexico	38	286	581	286	281	82	79	30	0
Northwest	6	209	120	30	190	30	2	0	0
Southeast	32	77	461	256	91	52	77	30	0
New York	0	372	1	4	1	0	0	0	0
North Dakota	1	2	52	13	11	166	4	1	0
Ohio	394	291	544	24	6	0	0	0	0
Oklahoma	910	2,559	2,584	897	811	902	123	25	0
Pennsylvania	26	490	114	27	48	11	1	0	0
South Dakota	0	2	9	1	1	3	0	0	0
Texas	1,763	4,338	4,094	3,245	3,935	1,611	353	219	13
N. Central (9)	798	1,647	590	680	542	107	28	0	0
W. Cent. (7-B)	292	1,011	636	555	584	3	0	0	0
West (7-C & 8)	114	510	1,236	935	1,113	1,335	262	202	1
Panhandle (10)	1	76	852	29	49	40	6	2	0
East (5 & 6)	71	124	96	220	372	88	11	2	0
Southwest (1)	145	673	317	268	142	19	8	2	0
Southwest (4)	49	175	178	188	479	246	53	2	1
Gulf Coast (2)	7	13	62	193	253	259	11	0	1
Gulf Coast (3)	86	109	127	177	417	514	144	9	10
Utah	10	35	6	8	23	8	2	0	0
West Virginia	20	144	167	96	12	0	0	1	0
Wyoming	75	68	178	153	275	132	29	4	1
Miscellaneous	11	38	10	10	9	3	1	0	0
Total	**5,181**	**13,705**	**14,679**	**8,012**	**8,741**	**3,948**	**1,642**	**675**	**99**



Thirteen states set new records as . . .

Production Passes 6¾ Million Barrels Daily

by John C. McCaslin

PRODUCTION of crude oil and lease condensate in the United States in 1955 rose 6.8 per cent over the previous year.

Averaging 6,777,207 bbl. daily, crude-oil and lease condensate production was 431,117 bbl. daily higher than during 1954. Total production for the year reached 2,473,704,000 bbl., an increase of 157,381,000 bbl.

Crude production in the last quarter of 1955 showed a gain of more than 500,000 bbl. daily over the last quarter of 1954. In fact, the entire last half of the year was up almost 500,000 bbl. daily. These quarterly gains cannot be credited entirely to gains in demand. Neither are they due to big decreases in crude imports.

Most big-gain quarters follow small-gain quarters of the previous year or even quarters for which large losses were reported. Low-production quarters for 1954 added to the normal gains in 1955. However, the major factor in the big increase was the over-all gain in product demand. Total demand for the year was up 7.8 per cent.

Required supply of new oil to meet demands in 1956 will be up almost 5 per cent over the 1955 average. New crude will gain 4.9 per cent but the gain in domestic production will depend on the division of the market between imported and domestic crude.

New Production Records

New production records were established in 13 states, most of them in the fast-growing Rocky Mountain producing region. Estimated Rocky Mountain totals exceeded 1954 production by more than 25 million barrels. Total production in the region was 191,195,000 bbl., excluding New Mexico.

North Dakota, up 84 per cent, and western Nebraska, with a 47 per cent increase, registered the biggest gains among the several states in terms of total production.

Every state in the region registered new gains in 1955. To a great extent this reflected new outlets to market, and a firm market for the crudes of the region. This is particularly true of Wyoming black oils, more in demand in 1955 than in any other postwar year.

Colorado set a new producing record at 52,751,000 bbl. The previous record was set in 1954 at 41,052,000 bbl. The 1955 output is a 28 per cent increase over the previous year. Montana's output for 1955 was 15,075,000 bbl., up 10 per cent. Nevada's output for the year was 76,000 bbl., up 130 per cent over the previous year. New Mexico produced 82,103,000 bbl.

South Dakota's three producing wells had an output of 27,000 bbl. in 1955. Utah production was up 354,000 bbl. over the previous high year (1954). The year's output in that state was 2,227,000 bbl.

In the Mid-Continent region, Kansas registered a new record crude-oil output. That state produced 121,643,000 bbl. of oil in 1955. Kentucky in the Eastern Interior region produced 15,472,000 bbl. of oil for a new record high. The biggest producer of all, Texas, had a crude output of 1,050,358,000 bbl. in 1955 for a new record.

On the Gulf Coast, Louisiana set a new producing record at 267,207,000 bbl.

Record at 267,207,000 bbl. . . . During 1955 Louisiana, particularly the Coastal region, experienced heavy development of old and new fields, adding production in many areas. Considerable development and added production were noted in Anse La Butte, Main Pass 69, and South Pass 24.

United States Production of Crude Oil and Lease Condensate

(Thousands of barrels)

	1955 prod. change	1955	1954	1953	1952	1951	1950	1949	Cum. prod.
Alabama	—173	1,411	1,584	1,694	1,279	1,020	735	462	9,651
Arkansas	—857	28,349	29,206	29,681	29,440	29,798	31,108	29,986	942,576
California	—581	355,198	355,779	365,085	359,450	354,561	327,607	332,942	10,409,671
Colorado	11,699	52,751	41,052	36,402	30,381	27,823	23,303	23,587	335,403
Florida	—50	498	548	543	591	596	487	441	4,356
Illinois	13,880	80,878	66,998	59,026	60,089	60,243	62,028	64,501	1,833,550
Indiana	—446	10,758	11,204	12,823	12,037	11,100	10,699	9,696	258,645
Kansas	2,326	121,643	119,317	114,566	114,807	114,522	107,586	101,868	2,710,733
Kentucky	1,681	15,472	13,791	11,518	11,918	11,622	10,381	8,803	316,567
Louisiana	21,114	267,207	246,093	256,632	243,929	232,281	208,965	190,826	3,807,158
Michigan	—689	11,338*	12,027	12,285	13,251	13,927	15,826	16,517	385,075
Mississippi	3,727	37,318	33,591	35,620	36,310	37,039	38,236	37,966	463,937
Montana	1,388	15,075	13,687	11,920	9,606	8,958	8,109	9,118	227,497
Nebraska	3,500	10,923	7,423	6,344	2,660	2,558	1,547	330	37,292
Nevada	43	76	33						109
New Mexico	6,903	82,103	75,200	70,441	58,681	52,719	47,367	47,645	1,021,539
New York	—337	2,920	3,257	3,800	4,242	4,254	4,143	4,425	185,074
North Dakota	5,111	11,127	6,016	5,183	1,549	25			23,900
Ohio	506	4,335	3,829	3,610	3,350	3,140	3,383	3,483	639,263
Oklahoma	15,390	201,739	186,349	202,570	190,435	186,869	164,599	151,660	7,203,071
Pennsylvania	—557	8,550	9,107	10,649	11,233	11,345	11,859	11,374	1,186,457
Texas	68,636	1,050,358	981,722	1,019,164	1,022,139	1,010,270	829,874	744,834	18,806,512
Utah	354	2,227	1,873	1,807	1,737	1,305	1,228	637	10,830
West Virginia	—592	2,310	2,902	3,038	2,602	2,757	2,808	2,839	454,569
Wyoming	5,383	99,016	93,633	82,618	68,074	68,929	61,631	47,890	1,328,068
Other States	22	124	102	63	46	50	65	110	2,241
Total U. S.	**157,381**	**2,473,704**	**2,316,323**	**2,357,082**	**2,289,836**	**2,247,711**	**1,973,574**	**1,841,940**	**52,603,744**
Daily avg.	**431**	**6,777**	**6,346**	**6,458**	**6,256**	**6,158**	**5,407**	**5,046**	

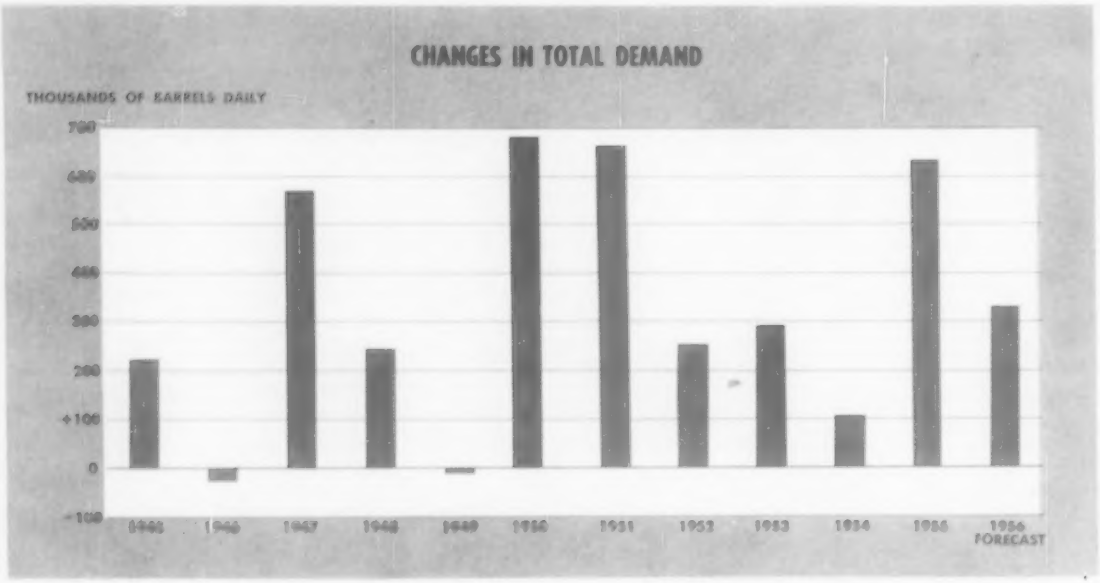
CRUDE-OIL PRODUCTION RECORDS

(Thousands of barrels)

	Record year	Production in record year
Alabama	1953	1,694
Arkansas	1925	77,398
California	1953	365,085
Colorado	1955	52,751
Florida	1951	596
Illinois	1940	147,647
Indiana	1953	12,823
Kansas	1955	121,643
Kentucky	1955	15,472
Louisiana	1955	267,207
Michigan	1939	23,462
Mississippi	1948	45,761
Montana	1955	15,075
Nebraska	1955	10,923
Nevada	1955	76
New Mexico	1955	82,103
New York	1882	6,685
North Dakota	1955	11,127
Ohio	1896	23,941
Oklahoma	1927	277,775
Pennsylvania	1891	31,424
South Dakota	1955	27
Texas	1955	1,050,358
Utah	1955	2,227
Virginia	1947	61
West Virginia	1900	16,196
Wyoming	1955	99,016

PRODUCTION AND PRODUCING WELLS

	Bbl. daily 1955	Producing wells	Daily avg. per well
Alabama	3,866	117	33.0
Arkansas	77,668	4,589	16.9
California	973,136	34,962	27.8
Colorado	144,522	2,149	67.3
Florida	1,364	12	113.7
Illinois	221,581	36,634	6.0
Indiana	29,474	5,034	5.9
Kansas	333,265	35,669	9.3
Kentucky	42,389	17,047	2.5
Louisiana	732,067	18,415	39.8
Michigan	31,063	4,087	7.6
Mississippi	102,240	2,348	43.5
Montana	41,301	3,889	10.6
Nebraska	29,926	767	39.0
Nevada	208	3	69.3
New Mexico	224,938	8,843	25.4
New York	8,000	17,155	0.5
North Dakota	30,484	589	51.8
Ohio	11,877	19,870	0.6
Oklahoma	552,704	74,693	7.4
Pennsylvania	23,424	55,930	0.4
Texas	2,877,666	163,376	17.6
Utah	6,101	73	83.6
West Virginia	6,329	14,325	0.4
Wyoming	271,274	6,429	42.2
Miscellaneous	340	159	2.1
Total U. S.	6,777,207	527,164	12.9



1955 needs rose 8 per cent; smaller 1956 increase seen as . . .

Domestic Demand Will Be 8¾ Million Barrels

by John C. Casper

DOMESTIC demand for petroleum products gained 8.0 per cent in 1955 and is expected to increase by 4.5 per cent this year.

The forecast for 1956 shows a daily average of 8,752,000 bbl. for a gain of 378,000 bbl. over 1955. This volumetric increase is very near the annual average of 385,000 bbl. daily for the period 1946-55. The percentage gain for this year, 4.5 per cent, is less than the average of 6.1 per cent for the postwar period.

Exports of crude and products will average about 322,000 bbl. daily this year for a decrease of 13.2 per cent from 1955. This reduction in offshore shipments will result in a slightly lower percentage gain for total demand than that indicated for domestic sales. Total demand will be up 3.8 per cent.

Volumetric increases in total demand for 1955 and 1956 are compared with other postwar years in the chart at the top of the page. Note that while 1955 was one of three postwar years with gains in excess of 600,000 bbl. daily, it was not the top year. The postwar record was set in 1950 with an increase of 682,000 bbl. daily.

Part of the big gain in 1955 can be attributed to the fact that the comparison is with a very poor record in 1954.

The forecast for 1956 is based on a high level of general business activity for the year but with a smaller increase over 1955 than the actual gain between 1954 and 1955.

The value of all goods and services produced in 1955 amounted to about 387 billion dollars for a gain of 7 per cent over the total for 1954. Even if production rates do not rise above the current levels in 1956, the total for the year will exceed that of 1955. The actual gain for 1956 is expected to be about 2 per cent compared with the 7 per cent increase in 1955.

Increases in production, refinery runs, and imports in 1956 will surpass the gains in total demand. This means that part of the year's output of crude and products will go to storage.

Crude and Product Stock Gains

Total stocks of crude and products dropped 10,600,000 bbl. in 1954. Refining trends and weekly reports of major product stocks indicate a small decrease, less than 1,000,000 bbl. in 1955. All of the decrease in 1954 was in crude, and very little of this was made up in 1955. The small increase in product stocks in 1954 and the small decrease in 1955 tended to offset the large gains in 1952 and 1953.

Crude stocks can move up 10,000,000 bbl. and still be within the normal working range. Product stocks increased at the average annual rate of 22,500,000 bbl. between 1946 and 1954 and can be expected to gain about that amount in 1956.

Thus, total new supply will be up about 4.8 per cent this year compared with a gain of 3.8 per cent for total demand.

The breakdown of new supply for 1956, forecast at 9,164,000 bbl. daily, should not be considered as a recommendation but as an estimate of probable division, based on information available at this time.

Domestic production of crude and natural-gas liquids is expected to average 7,837,000 bbl. daily, including 7,072,000 bbl. of crude and 765,000 bbl. of light products.

Imported crude for 1956 is forecast at 842,000

bbl. daily for a gain of 7.7 per cent or 60,000 bbl. daily. At least two-thirds of this gain will be due to increased receipts from Canada. If crude imports drop below 842,000 bbl. daily this year, the cut can be added to the forecast average for domestic crude production.

Product imports will be limited by tight supply in the Caribbean, particularly in the first quarter.

Refinery runs topped 8,000,000 bbl. daily in the first full week of operations in 1956. The average for the first quarter is expected to be about 6 per cent above the first quarter of 1956. The forecast total for the year is 7,816,000 bbl. daily for a gain of 4.6 per cent.

The four major products—gasoline, kerosine, distillate, and residual—accounted for 83.5 per cent of total domestic consumption of petroleum in 1955, but the gains by these products in 1956 may represent less than 70 per cent of the total increase for all products.

Continuing rapid expansion in the consumption of some of the minor products is the reason for this difference in percentages. The 23 per cent gain forecast for jet fuel is slightly less than the increase in 1955 but is well above the gain for any major product. Enlarged highway-construction programs this year will add greatly to the demand for asphalt and road oils. And, the growth in sales of L.P.G. will give that product a percentage increase for the year about in line with gain for distillate fuel, the leader of the major products.

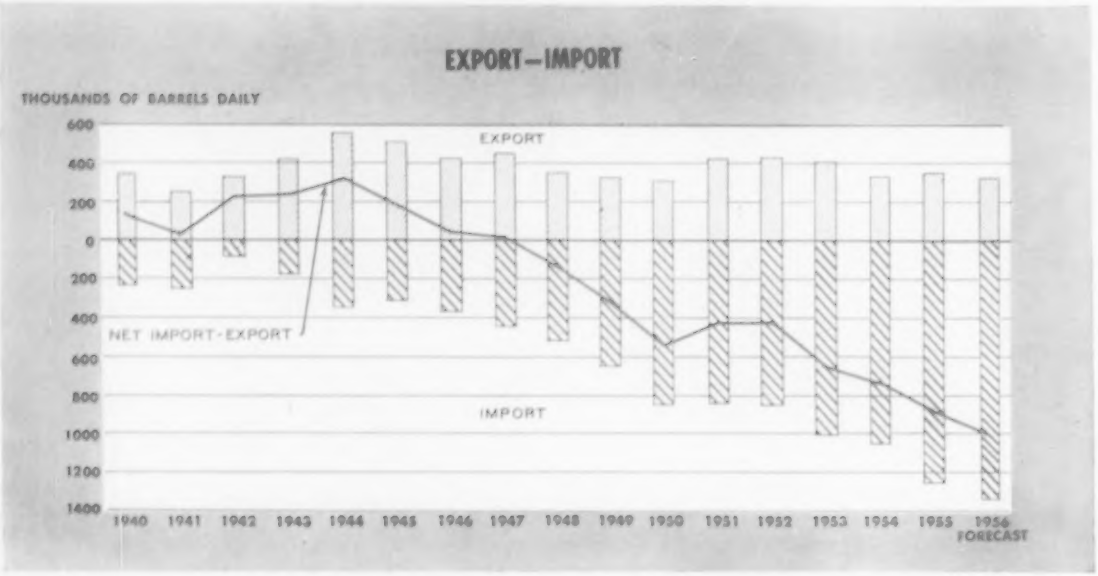
Details for the forecast by products and quarters are shown in the accompanying table.

1956 Supply and Demand Forecast by Quarters

(Thousands of barrels daily)

		Forecast for 1956									
		First quarter		Second quarter		Third quarter		Fourth quarter		Year 1956	
	Year 1955	Volume	Per cent change	Volume	Per cent change	Volume	Per cent change	Volume	Per cent change	Volume	Per cent change
Domestic demand	**8,375**	**9,350**	**5.2**	**8,144**	**4.6**	**8,197**	**4.1**	**9,317**	**4.1**	**8,752**	**4.5**
Gasoline	3,614	3,390	5.0	3,960	3.7	3,980	4.4	3,700	3.1	3,758	4.0
Kerosine	314	470	— 1.5	165	7.1	190	— 5.9	450	6.9	319	1.6
Distillate	1,592	2,390	7.2	1,165	7.2	1,155	6.8	2,095	5.8	1,700	6.8
Residual	1,512	1,785	11.9	1,395	0.5	1,285	0.2	1,640	1.2	1,526	0.9
Jet fuel	156	180	20.8	190	23.4	190	18.0	210	31.3	192	23.1
Lubricants	115	110	1.9	130	6.6	125	4.2	118	5.4	121	5.2
L.P.G.	381	454	8.9	345	9.2	368	4.0	453	4.1	405	6.3
Other products	656	541	11.1	769	7.6	879	7.5	621	3.0	703	7.2
Crude loss	35	30	— 6.3	25	— 9.3	25	—37.5	30	—14.3	28	—20.0
Exports	**371**	**300**	**—11.8**	**333**	**—12.4**	**340**	**—13.5**	**316**	**—14.6**	**322**	**—13.2**
Gasoline	95	80	— 1.2	90	— 2.2	90	—14.3	80	—20.0	85	—10.5
Kerosine	10	10	11.1	10	—10.0	10	—16.7	10		10	
Distillate	69	50	— 5.7	65	— 4.4	75	— 5.1	60	—20.0	63	— 8.7
Residual	93	65	—38.1	70	—27.1	65	—27.8	70	—12.5	67	—28.0
Jet fuel											
Lubricants	41	38	2.7	40	— 2.4	42		40	— 4.8	40	— 2.4
L.P.G.	11	13		12	9.1	12	9.1	12	9.1	12	9.1
Other products	21	19	5.6	21		21	— 4.5	19	—13.6	20	— 5.0
Crude	31	25	4.2	25	—37.5	25	—21.9	25	—16.7	25	—19.4
Total demand	**8,746**	**9,650**	**4.5**	**8,477**	**3.8**	**8,537**	**3.3**	**9,633**	**3.3**	**9,074**	**3.8**
Gasoline	3,709	3,470	4.9	4,050	3.6	4,070	3.9	3,780	2.5	3,843	3.6
Kerosine	324	480	— 1.4	175	6.1	200	— 6.5	460	6.7	329	1.5
Distillate	1,661	2,440	6.9	1,230	6.5	1,230	6.0	2,155	4.9	1,763	6.1
Residual	1,605	1,850	— 1.0	1,465	— 1.3	1,350	— 1.7	1,710	0.6	1,593	— 0.7
Jet fuel	156	180	20.8	190	23.4	190	18.0	210	31.3	192	23.1
Lubricants	156	148	2.1	170	4.3	167	3.1	158	2.6	161	3.2
L.P.G.	392	467	8.6	357	9.2	380	4.1	465	4.3	417	6.4
Other products	677	560	10.9	790	7.3	900	7.1	640	2.4	723	6.8
Crude	66	55	— 1.8	50	—26.9	50	—30.6	55	—15.4	53	—19.7
Stock change	**—2**	**—380**		**498**		**458**		**—218**		**90**	
Crude	2	— 35		60		60		25		27	
Products	—4	—345		438		398		—243		63	
New supply	**8,744**	**9,270**	**4.0**	**8,975**	**5.1**	**8,995**	**5.3**	**9,415**	**4.9**	**9,164**	**4.8**
Imports	**1,246**	**1,415**	**5.0**	**1,225**	**7.5**	**1,225**	**5.2**	**1,445**	**8.6**	**1,327**	**6.5**
Crude	782	840	12.9	800	8.8	855	6.2	875	3.9	842	7.7
Products	464	575	— 4.8	425	4.9	370	2.8	570	16.8	485	4.5
Production	**7,498**	**7,855**	**3.8**	**7,750**	**4.7**	**7,770**	**5.3**	**7,970**	**4.2**	**7,837**	**4.5**
Crude	6,777	7,075	3.6	7,025	4.5	7,025	5.2	7,160	4.1	7,072	4.4
Natural, etc.	721	780	5.4	725	6.9	745	6.0	810	5.6	765	6.1
Runs to stills	**7,473**	**7,877**	**6.0**	**7,697**	**5.4**	**7,752**	**2.7**	**7,937**	**4.3**	**7,816**	**4.6**
Total stocks†	**714.4**	**679.8**		**725.1**		**767.2**		**747.2**		**747.2**	
Gasoline	165.2	191.6		173.4		158.7		177.9		177.9	
Kerosine	27.3	16.5		28.5		35.0		26.8		26.8	
Distillate	112.1	64.4		107.2		154.1		128.1		128.1	
Residual	39.8	40.0		41.6		43.0		40.0		40.0	
Other products	110.9	111.4		113.0		109.5		105.2		105.2	
Crude	259.1	255.9		261.4		266.9		269.2		269.2	

*Partly estimated. †Stocks in millions of barrels at end of period.



Foreign oil shipments to U. S. almost 1¼ million barrels daily, as . . .

Imports Take Biggest Jump in 5 Years

by Henry D. Ralph

IMPORTS of foreign oil last year increased 18.4 per cent. That's one of the biggest jumps in years. They totaled 1,246,000 bbl. per day—an increase of 194,000 bbl. per day over 1954.

Only once in recent history have imports increased so much in a single year. That was 1950, when the Korean war and a combination of other factors boosted imports by 205,000 bbl. per day to the then astonishing total of 850,000 bbl. Since then imports have been climbing steadily.

And they will continue to climb. The Journal's forecast is that imports will total 1,327,000 bbl. during 1956. This is based on published and unpublished information plus our own guesstimate of political and economic pressures. This will be an increase of 6.5 per cent over 1955.

Curiously, this big 1955 jump in imports came during the year of greatest political activity to keep them down. Domestic producers raised Cain about imports continuously. They got results, too—in every way except an over-all cut in imports.

In February the President's Cabinet Committee on Energy Supplies and Resources Policy recommended that imports be held to the 1954 ratio to production. Later in the spring Congress almost imposed quota limitations on oil imports. Instead Congress directed the Office of Defense Mobilization to do something to keep imports from injuring domestic industry. And in the fall ODM made studies and issued policy decisions indicating that imports should be held down. But if these things had any practical effect it wasn't evident in the 1955 statistics. It might be in 1956.

We'll come back to that in a minute, but first let's take a look at some long-term trends. There's a chart on the right-hand page that shows the ratio of imports to total demand (total demand includes exports). Ever since the war this ratio has been rising, and now it's 14.2 per cent. To get anything like that you have to go way back to the early 1920's when crude was scarce and demand was high in the boom that followed World War I.

Now examine the table on the left-hand page that shows import and export trends since 1939. You can

IMPORT-EXPORT TRENDS
(Thousands of barrels daily)

	Imports			Exports		
	Crude	Products	Total	Crude	Products	Total
1939	91	71	162	198	320	518
1940	117	112	229	141	215	356
1941	139	127	266	91	207	298
1942	34	64	98	93	227	320
1943	38	136	174	113	298	411
1944	122	130	252	93	474	567
1945	203	108	311	90	411	501
1946	236	141	377	116	303	419
1947	267	170	437	127	324	451
1948	353	161	514	109	259	368
1949	421	224	645	91	236	327
1950	487	363	850	95	210	305
1951	490	354	844	78	344	422
1952	573	379	952	73	359	432
1953	648	386	1,034	55	347	402
1954	656	396	1,052	37	319	356
1955:						
1st quarter	**744**	**604**	**1,348**	**24**	**316**	**340**
2nd quarter	**735**	**405**	**1,140**	**40**	**340**	**380**
3rd quarter	**805**	**360**	**1,165**	**32**	**361**	**393**
4th quarter*	**842**	**488**	**1,330**	**30**	**340**	**370**
Year	**782**	**464**	**1,246**	**31**	**340**	**371**
1956†	842	485	1,327	25	297	322

*Estimated. †Forecast.

see that the total volume of imports has almost exactly doubled in the last 6 years.

It's this recently accelerating trend that worries domestic producers. In 1953 imports rose 8.6 per cent over the preceding year, 1.7 per cent in 1954, 18.4 per cent in 1955, and our forecast is for 6.5 per cent in 1956. That's total imports. But it's the trend in crude imports that is the biggest worry. Around 90 per cent of products imports is heavy fuel oil or resid—a product most refiners would rather not make if they could help it. Also, demand for resid is apt to fluctuate under the influence of a variety of factors.

Products imports increased 1.8 per cent over the preceding year in 1953, 2.6 per cent in 1954, 17.2 per cent in 1955, and it looks like 4.5 per cent in 1956. But crude imports increased 13.1 per cent in 1953, 1.2 per cent in 1954, 19.2 per cent in 1955, and it looks like 7.7 per cent in 1956. Our forecast for 1956 is that all imports will be up 81,000 bbl. per day over 1955, but that 60,000 bbl. of this will be in crude and only 21,000 bbl. in products. If there is a trend here it is that imports of heavy fuel oil will increase at about the same rate as the growth in our economic activity and in the demand for all petroleum products, while imports of crude will increase at a higher rate.

How Do They Jibe?

Now let's see how these trends jibe with the recommendation of the Cabinet Committee last February. This was that imports of crude and resid should not exceed significantly the respective proportions they bore to domestic crude production in 1954. In 1954 crude imports were 10.34 per cent of production and all products imports were 6.24 per cent (resid alone 5.57 per cent).

In 1955 crude imports were 11.54 per cent of domestic production and all products imports were 6.85 per cent (with resid estimated at 6.04 per cent). Based on Journal forecasts of imports and domestic production, 1956 will see crude imports at 11.99 per cent and all products imports at 6.91 per cent (with resid probably proportionately lower).

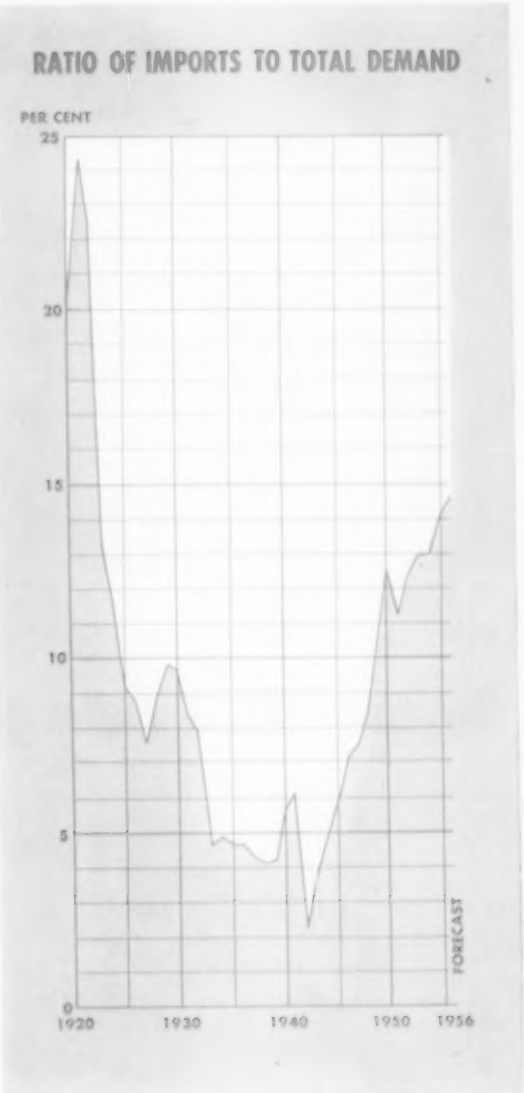
So it's easy to see that imports are running higher than the recommended levels. The big question is: Are they "significantly" higher? Next question, please.

The next question has to do with where the imports come from. For several years we've carried a table showing country of origin of crude imports, like the one at the bottom of this page. This year this table takes on added significance because of a new policy announced by ODM last fall. ODM said that for "defense and other reasons there need be no restrictions on imports from Canada and Venezuela, but that other imports ought to be reduced by 7 per cent during the first quarter of 1956.

For all practical purposes this means that any important curtailment will be in crude oil from the Eastern Hemisphere. Our table is for only 10 months, but since the figures are in daily averages they give a reasonably close picture for the entire year.

Crude imports from the Eastern Hemisphere rose from 209,100 bbl. daily in 1954 to 267,900 bbl. daily in 1955—an increase of 28.1 per cent while all imports were rising 18.4 per cent. If the ODM request is carried out and applied all through the year, crude imports from the Eastern Hemisphere will be quite a bit lower in 1956.

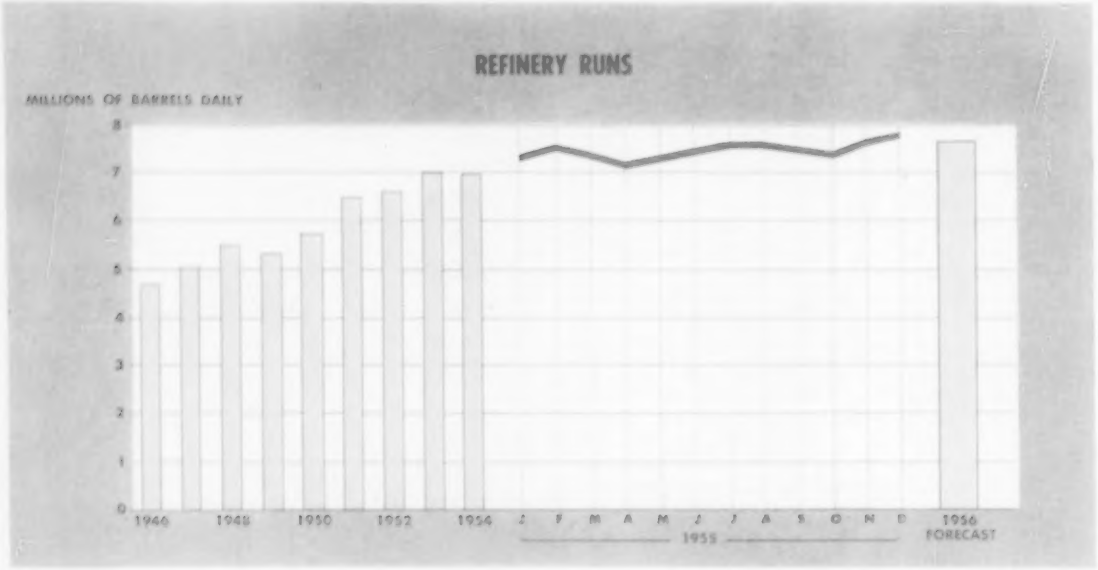
We're not making any forecasts on this point, but the 1956 rate of crude imports from the Eastern Hemisphere is the figure to watch if you want to see whether or not the political ruckus raised by importers is finally having some effect.



CRUDE IMPORTS BY COUNTRY OF ORIGIN
First 10 Months

(Thousands of barrels daily)

	1955	1954	Change Volume	Change Per cent
Mexico	18.9	13.4	5.5	41.0
Colombia	21.6	36.6	—15.0	—41.0
Venezuela	393.2	349.3	43.9	12.6
Peru	2.4	1.6	0.8	50.0
Ecuador	1.1	0.7	0.4	57.1
Trinadad		0.7	—0.7	—100.0
Kuwait	142.8	104.8	38.0	36.3
Saudi Arabia	78.6	83.2	—4.6	—5.5
Neutral Zone	7.6	6.7	0.9	13.4
Iraq	18.0	6.8	11.2	167.2
Iran	6.3		6.3	
Qatar	14.6	7.6	7.0	92.1
Canada	38.1	4.6	33.5	728.3
Far East	31.4	39.0	—7.6	—19.5
Total crude	**774.6**	**655.0**	**119.6**	**18.3**



Further expansion planned for 1956, as . . .

Refinery Runs Jump Half Million Barrels Daily

AFTER one of the biggest years in volume growth and probably its greatest in processing achievements, the refining industry in United States in 1956 will further expand all the major phases of its operations.

Domestic refiners last year ran an average of 7,473,000 bbl. daily of crude oil to their stills. This is an increase of 515,000 bbl. daily or 7.4 per cent over 1954 and a gain of 6.7 per cent over the previous record year of 1953.

In 1956 all the trends in demands and processing that were controlling in 1955 will continue. A more normal yearly gain of 343,000 bbl. daily or 4.6 per cent over 1955 is projected. (See page 153.) This means that domestic refiners will process 2,860,656,000 bbl. this year, a gain of slightly more than 100 per cent for a 15-year period.

More important to most refiners than the volume gain in crude oil runs to stills, and involving far more in capital expenditures, were the other changes in refinery processing. Reflecting these developments are data, based on Ethyl Corp. reports, which show that domestic refiners increased the octane ratings of their motor fuels 1.8 numbers from December 1, 1954 to December 1, 1955 in the case of premium motor fuel and 1.6 in regular. This was the largest yearly increase since 1949. Average octane ratings of aviation gasolines were also increased last year.

To accomplish this improvement in gasoline quality it was necessary for refiners further to expand their catalytic cracking and reforming and related operations. In some instances there was greater emphasis on alkylation, isomerization, and other specialized operations.

In general it is anticipated that this emphasis on improved quality in motor fuels, the money product of most refiners, will continue this year. Some are predicting a smaller gain in octane ratings in 1956, but there have been no developments in engine designs for motor vehicles or aviation use which point a leveling off in future octane requirements in gasolines.

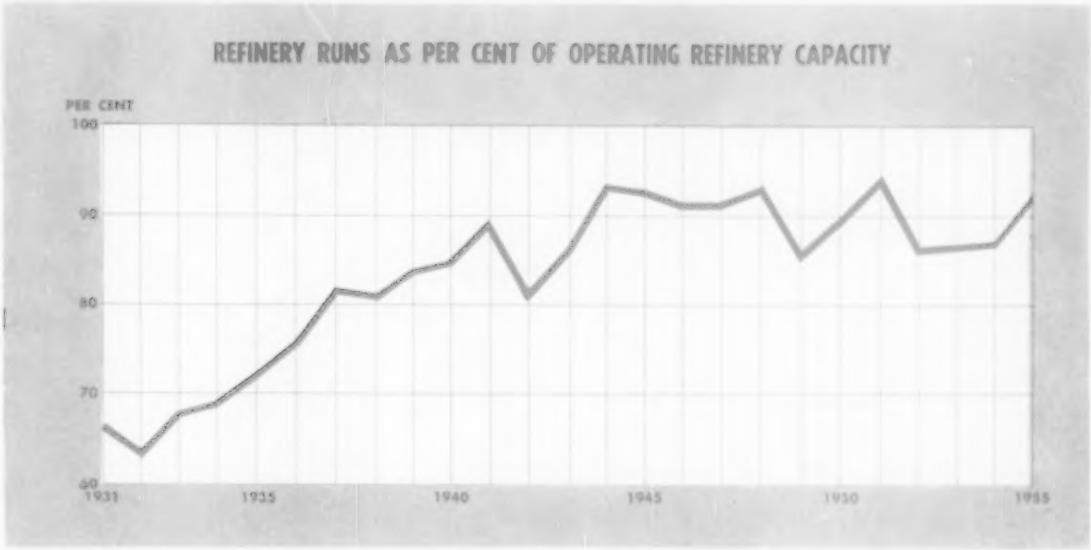
Other Yields

Improving gasoline quality with no sacrifice in yields partially accounts for the changes in yields of other products. Increasing the octane ratings of motor fuels tends to reduce yields and this trend can only be offset by cutting deeper into the other fractions of crude oil.

Kerosine yields in 1955 dropped another 0.5 per

REFINERY RUNS BY DISTRICTS
(Thousands of barrels daily)

												—% of total—	
	1925	1930	1935	1940	1945	1950	1951	1952	1953	1954	1955	1955	1925
East Coast	352	472	466	559	750	908	1,015	1,029	1,045	1,030	1,063	14.2	17.4
Appalachian	69	88	105	132	154	165	179	183	198	186	194	2.6	3.4
Illinois, Indiana, etc.	184	300	356	617	756	1,039	1,201	1,227	1,277	1,276	1,367	18.3	9.1
Oklahoma, Kansas, etc.	267	304	295	314	381	486	520	544	589	601	674	9.0	13.2
Texas Inland	99	164	169	169	231	209	245	257	256	238	254	3.4	4.9
Texas Gulf	297	426	550	923	1,105	1,312	1,567	1,599	1,698	1,689	1,835	24.6	14.6
Louisiana Gulf	139	113	118	123	272	470	502	522	550	573	656	8.8	6.8
North Louisiana and Arkansas	44	56	48	68	77	71	79	80	86	88	91	1.2	2.2
Rocky Mountain	72	57	52	82	126	199	230	240	254	257	275	3.7	3.5
West Coast	504	561	487	549	859	880	956	989	1,047	1,020	1,064	14.2	24.9
Total United States	**2,027**	**2,541**	**2,646**	**3,536**	**4,711**	**5,739**	**6,494**	**6,670**	**7,000**	**6,958**	**7,473**	**100.0**	**100.0**



cent to 4.3 per cent, which compares with 6 per cent yields in 1946-48. This reflects changes in domestic and export kerosine demands and increased use of the lighter fractions of kerosine in catalytic reforming.

With the percentage gains in distillate demands continuing to exceed those of any other major product it was necessary last year for refiners to step up their yields per barrel of crude oil charged from 21.3 per cent in 1954 to 22 per cent.

The steady decline in residual-fuel-oil yields which has been under way almost continuously since the close of World War I, except for the special conditions prevailing during World War II, was effective in 1955. The decline was 1.1 per cent to 15.3. The yields varied from 32.9 per cent in California to 5 per cent in the Oklahoma-Kansas-Missouri area.

In the Mid-Continent and in other areas there are now a number of refiners who do not have residual fuel as plant products.

This has been brought about at an increasing number of refineries by running all residual products to coke. This development is shown in Bureau of Mines reports which reveal that coke production the first 10 months of 1955 increased 17 per cent over the same period in 1954.

Another factor in the lowered yields of residual fuel has been the expanding market for asphalts and road oils. Asphalt production increased 11 per cent while road-oil production expanded 17 per cent.

REFINERY YIELD TRENDS

	Runs (thou. bbl. daily)	Yields (per cent) Gasoline	Kerosine	Distillate	Residual
1935	2,646	44.2	5.8	10.4	26.9
1936	2,920	44.1	5.3	11.8	27.0
1937	3,242	43.9	5.5	12.4	26.4
1938	3,192	44.3	5.5	13.0	25.3
1939	3,391	45.0	5.5	13.1	24.7
1940	3,536	43.1	5.7	14.2	24.4
1941	3,861	44.2	5.2	13.4	24.3
1942	3,655	39.8	5.1	14.7	26.9
1943	3,917	37.1	5.0	14.8	29.2
1944	4,551	39.4	4.7	14.4	27.7
1945	4,711	40.9	4.7	14.5	27.3
1946	4,740	39.6	6.0	16.6	24.9
1947	5,075	40.2	6.0	16.8	24.2
1948	5,549	40.3	6.0	18.7	22.9
1949	5,327	43.7	5.2	17.4	21.7
1950	5,739	43.0	5.6	19.0	20.2
1951	6,494	42.4	5.7	20.0	19.7
1952	6,670	43.0	5.4	21.3	18.6
1953	7,009	43.9	4.8	20.7	17.6
1954	6,958	43.8	4.8	21.3	16.4
1955	**7,473**	**43.9**	**4.3**	**22.0**	**15.3**

Relative Positions

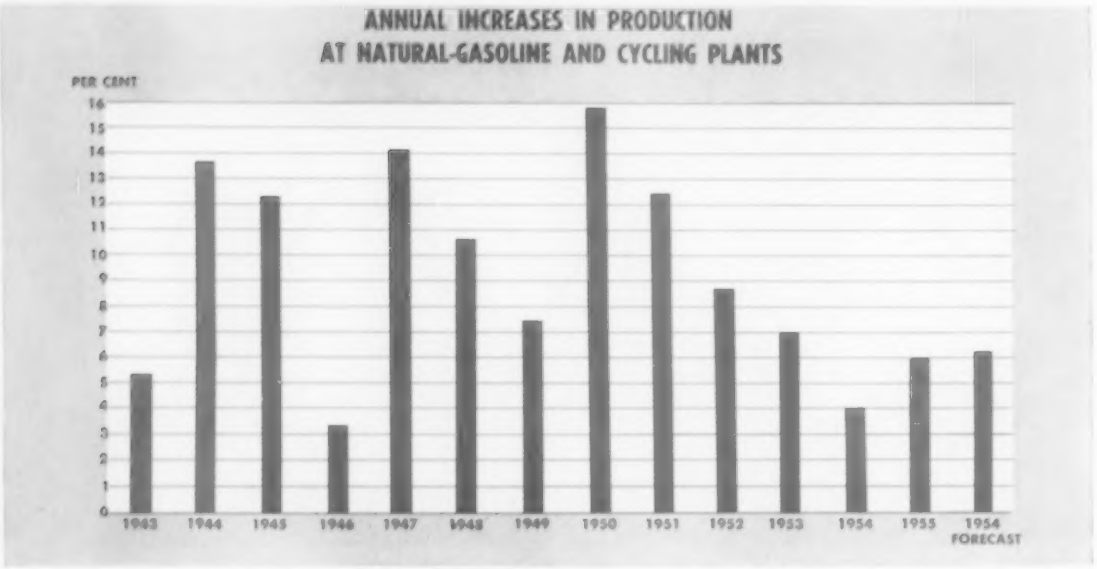
Last year both the Gulf Coast and the Oklahoma-Kansas-Missouri areas increased their percentage positions in domestic refining operations while declines materialized in the East Coast, Appalachian, West Coast, and the North Louisiana-Arkansas groups of refineries. The percentages of the remaining areas were unchanged.

In general the current trend in relative positions of the domestic refining groups has been under way since the close of World War II. Over the 10-year period Gulf Coast refiners (Texas and Louisiana) have jumped from 28.3 to 33.4 per cent of the total runs to stills so that they now account for one-third of the refinery operations in this country.

The Illinois-Indiana-Kentucky area increased from 16 to 18.3 per cent during 1945-55, and there was a small gain in the Oklahoma-Kansas-Missouri group. In percentage growth in crude runs to stills the Rocky Mountain states have had the largest gain but with 3.7 per cent of the total the area is still a minor factor in domestic refinery operations.

All the other refining areas have shown a fairly consistent drop in percentage positions. This was particularly noteworthy in the case of the West Coast, which dropped from 18.2 per cent in 1945 to 14.2 per cent last year. It is pointed out by observers that the steady West Coast decline may be arrested or reversed when the full effect of the new Northwest refinery operations are reflected in the yearly data.

The domestic refining industry starts a new year with better plant realizations than prevailed a year ago because of improved marketing conditions in the sale of products. This was brought about by a balance in supply and demand last year despite the large increase in crude runs to stills. Undesirable inventory situations that developed during 1954 were largely corrected during 1955 and stocks at refineries were generally at healthy levels at the start of this year.



Unbroken record of increases still intact as . . .

Natural-Gas Liquids Gain Even 6 Per Cent

by John C. Casper

PRODUCTION at natural-gasoline and cycling plants averaged 720,500 bbl. daily in 1955 for a gain of 40,700 bbl. daily or 6.0 per cent over 1954, continuing the unbroken record of annual increases since L.P.G. was first included in light-product statistics in 1942.

For the past 14 years, the average annual increase in production has been 9.2 per cent compared with an average gain of 4.5 per cent in crude production.

A large part of the total expansion in production at plants came in the late years of World War II and in the early postwar years. The last big year of growth was in 1951 when the gain for the year was 12.5 per cent. Since that time, the gains have ranged from 4.0 per cent in 1954 to 8.8 per cent in 1952 with an average annual increase of 6.5 per cent.

The outlook for 1956 is for a gain that is about in line with normal growth since 1951.

Plant production of L.P.G. averaged 357,800 bbl. daily in 1955. This rate represented a gain of 9.8 per cent over production in 1954 but fell short of the average gain of 16.3 per cent a year since production records were started in 1952.

L.P.G. production at plants exceeded natural-gasoline production first in 1952. Rapid growth in demand for this product has given it each year a larger portion of over-all plant output. For 1956, L.P.G. production will represent, for the first time, better than 50 per cent of total output at natural-gasoline and cycling plants.

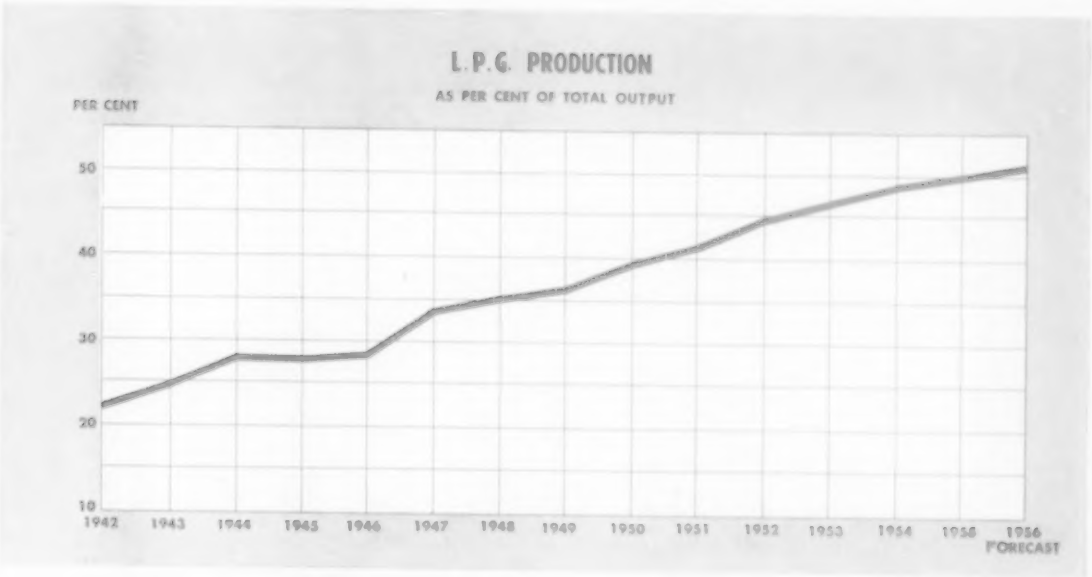
The above totals represent production only at natural-gasoline and cycling plants. Refinery production of liquefied refinery gases averaged about 115,000 bbl. daily for 1955. Part of the L.P.G. from plants was sent to refineries for blending into motor fuel, but the total domestic demand for L.P.G. and L.R.G. as fuel or feed for chemical plants averaged about 370,000 bbl. daily in 1955.

Plant production of natural gasoline has been increasing steadily since 1942 but at a much slower rate than L.P.G. or even than total plant output. Production of natural gasoline averaged 279,100 bbl. daily in 1955 for a gain of 4.5 per cent over 1954.

PRODUCT OUTPUT AT NATURAL-GASOLINE AND CYCLING PLANTS—1955*
(Thousands of barrels daily)

	L.P.G.	Natural gasoline	Other	Total	Per cent increase
Appalachian	9.7	2.8	0.1	12.6	—10.6
Ill., Ky., Mich.	29.2	3.9	0.2	33.3	3.1
Kansas	7.8	8.1		15.9	16.1
Oklahoma	30.7	30.0	0.2	60.9	7.8
Arkansas	3.7	2.8	0.3	6.8	— 4.2
Louisiana	18.2	17.6	31.9	67.7	9.5
Gulf	7.7	10.8	13.3	31.8	17.8
Inland	10.5	6.8	18.6	35.9	3.2
Mississippi	0.9	1.2	0.4	2.5	—10.7
New Mexico	17.9	16.2	0.1	34.2	17.5
Texas	207.1	138.9	45.7	391.7	6.1
Gulf Coast	36.3	30.9	18.2	85.4	11.5
West Texas	61.4	63.0	0.2	124.6	13.6
East Texas	17.3	11.3	0.4	29.0	4.7
Panhandle	55.4	4.5	0.4	60.3	2.6
Other Texas	36.7	29.2	26.5	92.4	— 4.1
Rocky Mountain	5.6	4.4		10.0	9.9
California	27.0	53.2	4.7	84.9	1.0
Total U. S.	**357.8**	**279.1**	**83.6**	**720.5**	**6.0**

*Ten months actual, 2 months estimated.



Total plant output increased 6.0 per cent and L.P.G. production was up 9.8 per cent.

For the period 1942-1955, total plant production gained 215.6 per cent, L.P.G. 608.5 per cent, and natural gasoline 106.6 per cent. Plant production of finished gasoline and other products has had a smaller growth since 1942 than either L.P.G. or natural gasoline. Production under this classification in 1955 averaged 83,600 bbl. daily or not quite double the average of 42,700 bbl. daily reported for 1942.

The outlook for expansion in the use of gas-liquid products for motor-fuel blends is bright, but with some reservations. Catalytic reforming of the heavy ends of natural gasoline produces a very good blending component of motor fuel, but the process is economical only for fairly large-scale operations.

Better than 93 per cent of all natural-gas liquids produced at plants in 1955 came from the top six states or areas. Texas accounted for 54.4 per cent of total production. The growth in Texas production has tended to parallel the over-all expansion for the past few years. Texas produced 54.3 per cent of the total in 1954 and 55.2 per cent the year before.

TOTAL PLANT PRODUCTION BY YEARS
(Thousands of barrels daily)

	1950	1951	1952	1953	1954	1955*
Appalachian	13.6	14.4	16.4	13.3	14.1	12.6
Ill., Ky., Mich.	13.6	14.0	19.9	24.9	32.3	33.3
Kansas	10.1	11.7	12.5	14.1	13.7	15.9
Oklahoma	40.4	48.2	50.8	55.3	56.5	60.9
Arkansas	6.4	6.4	7.2	7.4	7.1	6.8
Louisiana	56.9	61.6	63.1	62.2	61.8	67.7
Gulf	21.8	24.1	26.1	27.5	27.0	31.8
Inland	35.1	37.5	37.0	34.7	34.8	35.9
Mississippi	3.6	3.3	3.4	3.3	2.8	2.5
New Mexico	13.8	15.3	18.1	19.1	29.1	34.2
Texas	256.6	297.3	328.3	360.6	369.2	391.7
Texas Gulf	58.9	68.4	74.9	76.4	76.6	85.4
West Texas	(†)	63.2	74.1	101.0	109.7	124.6
East Texas	28.3	30.4	33.1	32.1	27.7	29.0
Panhandle	43.8	49.0	51.8	55.6	58.8	60.3
Other Texas	125.6	86.3	94.4	95.5	96.4	92.4
Rocky Mountain	6.0	7.9	8.6	8.1	9.1	10.0
California	77.6	80.9	82.3	85.3	84.1	84.9
Total U. S.	**498.6**	**561.0**	**610.6**	**653.6**	**679.8**	**720.5**

*Ten months actual, 2 months estimated. †Included in other Texas.

California still holds second place, but has had very little gain in production since 1950. The average for 1955 was only 7,300 bbl. daily more than in 1950, and the state's portion of the national total dropped from 15.6 per cent in 1950 to 11.9 per cent in 1955.

New Mexico has had the largest relative gain in the past 5 years with 1955 production 2.48 times that of 1950. Part of the recent growth in Illinois and Kentucky can be credited to low-temperature extraction plants on large natural-gas pipelines.

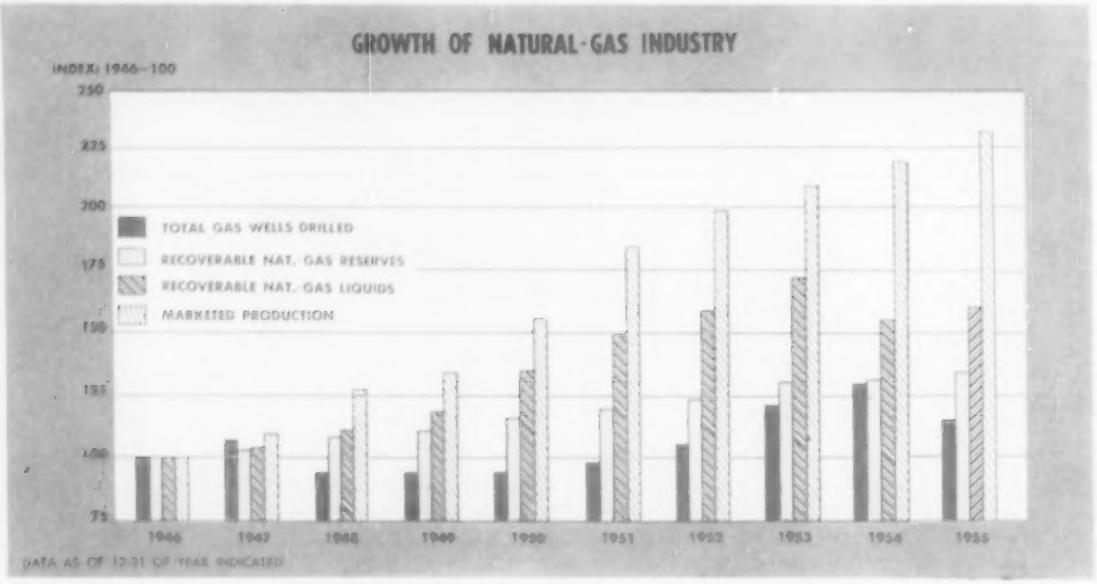
PRODUCT OUTPUT BY YEARS
(Thousands of barrels daily)

	L.P.G.	Natural gaso.	Other	Total	% Inc. Total	% Inc. L.P.G
1942	50.5	135.1	42.7	228.3	3.0	9.5
1943	59.4	138.0	42.9	240.3	5.3	17.6
1944	76.1	142.4	54.8	273.3	13.7	28.1
1945	184.8	1170.4	51.7	306.9	12.3	11.4
1946	89.6	177.9	49.6	317.1	3.3	5.7
1947	120.8	181.6	59.7	362.1	14.2	34.8
1948	140.0	197.5	63.3	400.8	10.7	15.9
1949	155.2	199.7	75.5	430.4	7.4	10.9
1950	195.2	213.4	90.0	498.6	15.8	25.8
1951	232.4	234.1	94.5	561.0	12.5	19.1
1952	272.5	244.7	93.4	610.6	8.8	17.2
1953	301.4	256.4	95.8	653.6	7.0	10.6
1954	325.9	267.2	86.7	679.8	4.0	8.1
1955*	**357.8**	**279.1**	**83.6**	**720.5**	**6.0**	**9.8**
1956†	390.0	295.0	80.0	765.0	6.2	9.0

*Ten months actual, 2 months estimated. †Forecast. ‡Isopentane included in natural gasoline, starting with 1945.

AVERAGE NATURAL-GASOLINE PRICES—GRADE 26-70
(Cents per gallon)

	1955		1954	
	Group 3	North Texas	Group 3	North Texas
January	5.50	5.00	5.40	4.90
February	5.05	4.50	5.00	4.50
March	4.50	4.00	4.97	4.47
April	4.50	4.00	4.08	3.58
May	4.50	4.00	4.50	4.00
June	4.53	4.05	4.50	4.00
July	5.00	4.50	4.29	3.71
August	5.00	4.50	4.50	4.00
September	5.48	4.98	5.00	4.50
October	5.50	5.00	5.00	4.50
November	6.00	5.48	5.50	5.00
December	5.94	5.50	5.50	5.00
Year average	**5.13**	**4.63**	**4.85**	**4.34**



Gas-well completions drop, gloom thick, as . . .

Federal Controls Hamstring Natural-Gas Industry

by Norman S. Morrisey

THREAT of federal control curtailed drilling in the natural-gas industry during 1955. Total gas-well completions dropped from an all-time high of 3,977 wells in 1954 to 3,613, a decrease of 10 per cent. New Mexico was the only key area that showed an appreciable increase in the number of gas wells completed, a gain of 172 wells over the 1954 figure. Texas registered the largest drop, down 309 wells, with total gas wells in 1955 only 603 compared to 912 the previous year.

At the end of 1955, the nation had proved natural-gas reserves of nearly 214 trillion cubic feet; this was a gain of only 2.081 trillion cubic feet over the adjusted 1954 reserve figure, or 6 months' supply at the present rate of consumption. The gas industry has nearly 23 years' supply of reserves based on the present rate of consumption. But with the rapid growth of markets for natural gas and the anticipated increased rate of consumption, it is more probable that the country now has only enough proved reserves to last 10-15 years.

Marketed production has risen rapidly. In 1946 annual consumption stood at 4 trillion cubic feet and the ratio of proved reserves to annual consumption was 40:1. Now marketed production has soared to 9.4 trillion cubic feet and the ratio of reserves to production is only 23:1. The rate of consumption has increased faster than the rate at which we are increasing our gas reserves; and in recent years this situation has been aggravated by federal control of natural-gas production.

Both development drilling and successful wildcats slumped 10 per cent under 1954. This trend is expected

MARKETED PRODUCTION OF NATURAL GAS

(Millions of cubic feet)

State—	1955	Per cent change over 1954	1954	Per cent change over 1953	1953	Per cent charge over 1952	1952	Cumulative 1906-55	Per cent of U.S.
Texas	4,808,400	5.7	4,551,232	3.8	4,383,158	5.7	4,147,805	49,703,609	39.2
Louisiana	1,528,700	9.3	1,399,222	8.2	1,293,644	4.6	1,237,143	16,920,240	13.4
Oklahoma	689,400	11.9	616,355	2.7	599,955	8.3	554,033	12,411,523	9.8
California	520,300	2.6	507,289	—4.5	531,346	2.7	517,450	12,984,812	10.3
New Mexico	512,300	14.0	449,346	12.6	399,086	14.3	349,229	3,685,505	2.9
Kansas	450,000	9.1	412,369	—2.0	420,607	2.0	412,544	5,630,582	4.4
West Virginia	201,800	5.3	191,601	2.7	186,477	3.0	180,995	9,190,787	7.3
Pennsylvania	129,300	—11.4	145,934	38.3	105,558	—2.9	108,684	5,239,662	4.1
Mississippi	156,800	11.6	140,448	—9.0	154,254	—11.4	174,100	1,188,822	0.9
Kentucky	73,100	0.5	72,713	1.8	71,405	—2.8	73,427	1,720,390	1.4
Subtotal	**9,070,100**	**6.9**	**8,486,509**	**4.2**	**8,145,490**	**5.0**	**7,755,410**	**118,675,932**	**93.7**
Other states	**313,800**	**22.6**	**256,037**	**1.8**	**251,426**	**1.4**	**247,899**	**8,002,197**	**6.3**
Total U. S.	**9,383,900**	7.3	**8,742,546**	4.1	**8,396,916**	**4.9**	**8,003,309**	**126,678,129**	**100.0**

Comparison of Drilling Activity in the Natural-Gas Industry

	1954			1955			Change
	Field wells	Successful wildcats	Total gas wells	Field wells	Successful wildcats	Total gas wells	in total wells
Arkansas	4	6	10	6	4	10	0
California	32	15	47	50	14	64	+ 17
Colorado	52	20	72	61	23	84	+ 12
Illinois	3	1	4	10	6	16	+ 12
Indiana	11	1	12	22	0	22	+ 10
Kansas	347	34	381	328	34	362	− 19
Kentucky	208	6	214	150	12	162	− 52
Louisiana	242	46	288	249	33	282	− 6
Michigan	8	2	10	17	2	19	+ 9
Mississippi	8	0	8	1	0	1	− 7
Montana	15	2	17	13	3	16	− 1
Nebraska	17	3	20	3	1	4	− 16
New Mexico	372	20	392	553	11	564	+172
Ohio	247	4	251	243	7	250	− 1
Oklahoma	358	25	383	328	31	359	− 24
Pennsylvania	480	3	483	284	7	291	−192
Texas	749	163	912	471	132	603	−309
Utah	8	1	9	2	8	10	+ 1
West Virginia	396	31	427	432	11	443	+ 16
Wyoming	19	10	29	37	9	46	+ 17
Others	2	6	8	0	5	5	− 3
Total	**3,578**	**399**	**3,977**	**3,260**	**353**	**3,613**	**−364**

to continue until some satisfactory legislation is passed that will eliminate the problem of federal control. Pipeline commitments, offset obligations, and local markets, however, will serve as incentives for additional drilling in 1956, but the outlook is for another year comparable to 1955 with a continued decline in the total number of gas wells completed. Passage of the Harris bill would allow slight relief, but some experts doubt that this would completely remedy the situation.

From a long-term standpoint, the current dilemma facing the gas industry will have a serious effect comparable to that faced by the oil industry during the depression years of the early thirties. Then oil companies were forced to curtail their exploration effort because of lack of funds. It took the oil companies many years to rebuild their staffs up to a point of efficiency, and, of course, their reserve picture suffered.

The market for natural gas continues to grow at a rapid rate with the 1955 consumption hovering at 9,384 billion cubic feet or 2.32 times the 1946 base figure. The rate of growth during 1955 exceeded the 1954 figure (232 versus 216) and compares favorably with the 1950 and 1951 era when new pipelines gave the industry untapped markets.

Future reserves . . . The Rocky Mountains still offer much in the way of undiscovered reserves and 1956 will see an accelerated gas-exploration program. Cretaceous and Tertiary sands in the basins of Colorado, Utah, New Mexico, and Wyoming are the principal reservoirs, and the pipeline outlet to the Pacific Northwest will insure rapid development of any new reserves.

- In the Mid-Continent gas wells are frequently a more attractive venture than oil wells because of the faster payout. However, unless there is a local market, gas drilling will not increase perceptibly in 1956.

- Ark-La-Tex gas operators are now well into the development phase with the accent on development drilling rather than exploration.

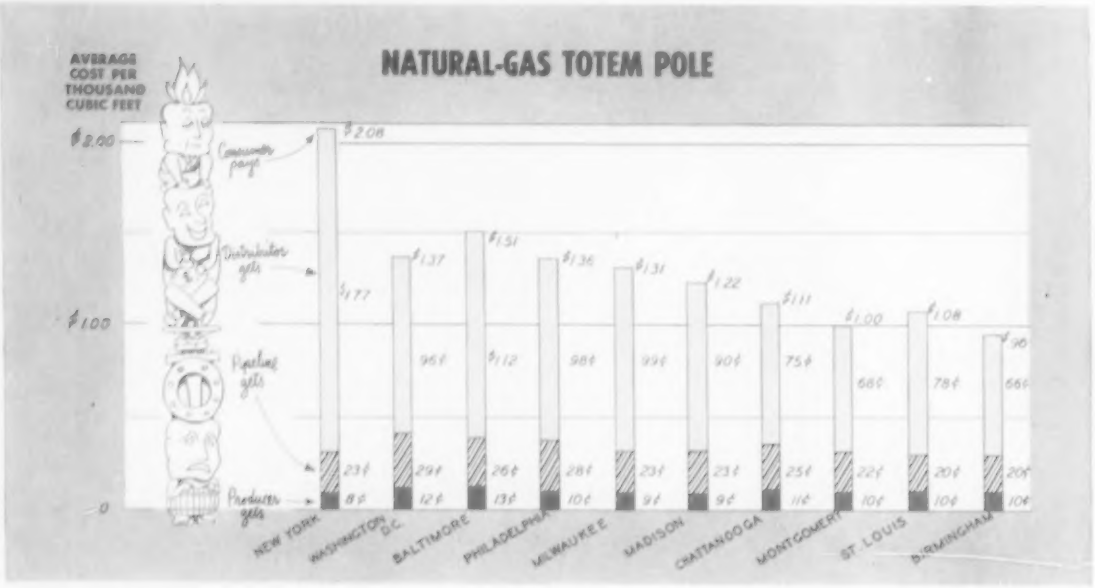
- Southeastern United States may well harbor a rich gas reserve, but this area is largely an unknown quantity. Here both Tertiary and Cretaceous reservoirs are present, but lack of subsurface data prevents any reliable estimate of the area's gas potential. Since the geology of the area resembles rather closely North Louisiana and East Texas, it seems reasonable to expect comparable gas-producing zones in the southeastern United States.

- Offshore 16 out of the 32 successful wildcats were either gas or gas-condensate wells, the majority of the offshore gas fields are still shut in, pending suitable pipeline outlets, but the 1955 record indicates that a substantial gas reserve lies under the Gulf of Mexico.

ESTIMATED PROVED RECOVERABLE RESERVES OF NATURAL GAS IN THE UNITED STATES
(Billion cubic feet at 60° F. and 14.65 psia.)

State—	Jan. 1, 1955*	Jan. 1, 1956	Change
Arkansas	1,165	1,160	− 5
California	9,027	9,050	+ 23
Colorado	1,933	2,020	+ 87
Illinois	254	275	+ 21
Indiana	36	37	+ 1
Kansas	15,758	15,650	− 108
Kentucky	1,287	1,270	− 17
Louisiana	36,800	37,000	+ 200
Michigan	330	367	+ 37
Mississippi	2,773	2,750	− 23
Montana	724	685	− 39
Nebraska	193	200	+ 7
New Mexico	17,241	18,500	+1,259
New York	69	70	+ 1
Ohio	775	785	+ 10
Oklahoma	12,396	12,550	+ 154
Pennsylvania	732	750	+ 18
Texas	105,129	105,500	+ 371
Utah	387	345	− 42
West Virginia	1,607	1,613	+ 6
Wyoming	2,855	2,970	+ 115
Others	240	245	+ 5
Total United States	**211,711**	**213,792**	**+2,081**

*American Gas Association figures as of December 1, 1954.



The natural-gas producer will remain . . .

Low Man on the Totem Pole

by Henry D. Ralph

IT'S easy to make a review and forecast of the political and economic status of natural-gas producers.

In 1955 they got nowhere fast. In 1956 they will be wholly preoccupied with arguing over regulations and orders and learning how to live under federal control—whether or not Congress passes the pending Harris-Fulbright bill.

That's because the gas producer is the low man on the totem pole and is destined to stay there for quite a while.

Take a look at that chart at the top of this page. It's a picture of the gas "totem pole."

You can see how low the producer is. He's that little black patch at the bottom, taking all the risks of exploration and production and selling his gas for about a dime. Sitting on top are the city gas companies, collecting from six bits to two bucks for distributing the same gas to home owners.

In between are the pipelines. They're getting squeezed some, but it's the guy on the bottom who's getting all the pressure.

More pressure . . . This pressure will get worse if Congress doesn't pass the Harris bill. The pressure will let up some if the bill is passed—but not a whole lot. All production of natural gas is going to be affected by federal regulation to a very considerable degree from here on out—and here's why:

First, a review of 1955.

Things were in a mess a year ago. The Supreme Court, in the Phillips decision, had told the Federal Power Commission to fix the prices of gas producers selling to interstate pipelines. FPC didn't know exactly how to do this, but its first attempts completely disrupted and confused the producing end of the business. No producer knew his legal rights, what sort of contract would be valid, or what price he would get.

The only way out seemed to be a change in the law. Early in 1955 the Harris-Fulbright bills were introduced to remove producers from direct regulation as utilities but leave FPC with some authority to keep field prices of gas from climbing excessively.

Hearings ran for weeks before House and Senate committees, and that's when producers discovered how low down on the totem pole they actually are. They appeared to have not a friend in the world. They were denounced as monopolies and extortionists, blamed for high retail gas prices in cities 1,000 miles away, and jumped on by distributors, politicians, editors, and assorted demagogs from consuming states.

Last spring the Harris bill squeezed through the House by a six-vote margin, but Senate action was postponed to 1956. So the year ended about as it began—with producers suspect and harassed with no clarification of the sort of regulation they must do business under or what prices they might get.

Either way, they lose . . . So now it's January 1956, with the Harris bill still pending and a close Senate vote in prospect. Either the bill will pass or it won't, but in either event gas producers are in for more harassment, suspicion, encumbrance, uncertainty, argument, and litigation.

Assume the bill becomes law. Independent producers will be exempt from direct regulation by FPC. They won't be considered public utilities. They can do business much as they did before the Phillips decision—except that FPC will put a ceiling on the field price of gas.

This ceiling is described in the Harris bill as the

"reasonable market price." It applies to both old and future contracts to sell gas to interstate pipelines. Very little gas is going to be sold above this ceiling.

On existing contracts it will work like this: When a pipeline applies for an increase in rates because it has to pay more for gas under an escalation clause in its supply contract, FPC will determine whether the increased field price is above the reasonable market price.

If it is, the escalation clause is nullified, the stepup in prices is not allowed, and the producer will not get the higher price called for in his contract. But all other provisions of the contract remain in effect. A producer can't exercise the "escape clause" to void the contract because of federal regulation. He must keep on delivering gas at the old low price.

On new supply contracts, made after enactment of the Harris bill, FPC will also set a reasonable field price. The pipeline can pay producers more than that ceiling if it wants to or has to, but it can't collect the difference from its customers. So most pipelines will get an FPC determination before their contracts go into effect.

When a new pipeline applies for a certificate, or an old one wants to expand its facilities, FPC will look into its gas-purchase contracts and decide whether or not the proposed price is the reasonable market price. If it's not, then the pipeline is not allowed to build its new facilities until it renegotiates its supply contracts downward or finds other gas that's cheaper.

What's "reasonable?" . . . So the key to the operation of the Harris bill, and to the future of gas producers operating under it, is that phrase "reasonable market price."

What does it mean? Nobody knows for sure. It has no specific definition in law, is not in the vocabulary of FPC or other public-utility regulatory bodies.

The Harris bill says that it shall be the reasonable market price at the point at which the gas is delivered into the transportation facilities of the natural-gas (pipeline) company in or within the vicinity of the field or fields where produced, and that in determining the reasonable market price FPC shall consider, among other things, whether such price has been competitively arrived at, the effect of the contract upon the assurance of supply, and the reasonableness of the provisions of the contract as they relate to existing or future prices.

Opponents of the Harris bill say that "reasonable market price" means "no regulation at all." They say it is synonymous with the current field price, or weighted average price, that it is nothing more nor less than the highest available price or the price which the market will bear. All FPC can do, they say, is to ascertain whether the price charged is in line with the other prices in the field.

Drafters of the bill disagree. They say FPC will be able to use its judgment and discretion in weighing a number of relevant factors to determine the reasonable market price. Among these might be the quality of the gas, its location, nature of the reservoir, cost of production, competitive conditions, economic pressures on either the buyer or the seller, conditions of delivery, and other situations applicable to a given contract.

Argument aplenty . . . So there is plenty of room for argument as to what FPC will do about setting reasonable market prices. And argument there will be.

FPC will start setting reasonable market prices, case by case, as price increases and new contracts come before it. Since the first few cases will set precedents, all interested parties will intervene and get their viewpoints into the record. So the first few cases may be pending before FPC for months before there are any decisions serving as guideposts to what may be a reasonable market price.

It's hardly possible that the first decisions will suit everybody. So somebody will appeal to the courts to have the commission's decision set aside or modified, or to force it to give greater weight to some factor.

And there we go again on another round of litigation until the Supreme Court finally tells FPC what it thinks the law means by "reasonable market price."

Fool's paradise . . . If producers think they will have things their own way under the Harris bill they are living in a fool's paradise. Representatives of consumer interests are going to be on their backs, peering over their shoulders, breathing down their necks from here on out. These folk got their taste of blood in the Phillips decision, and they're not going to give up easily. They will do everything the legal mind can devise to keep field prices of natural gas from going up and to impose some measure of federal regulation on producers.

Already some legal eagles are pointing out that several provisions of the Harris bill may be unconstitutional. That means court battles, so it's a safe prediction that passage of the Harris bill will bring gas producers more uncertainty, harassment, and litigation.

On the other hand . . . All right, suppose the Harris bill isn't passed.

Then FPC will get down to business applying the 1938 Natural Gas Act to producers and trying to fix their field prices by the formula used for setting rates of public utilities. Up to now the commission has been poking along, trying to avoid issues and postpone decisions, obviously more than half hoping that Congress would get it off the hook.

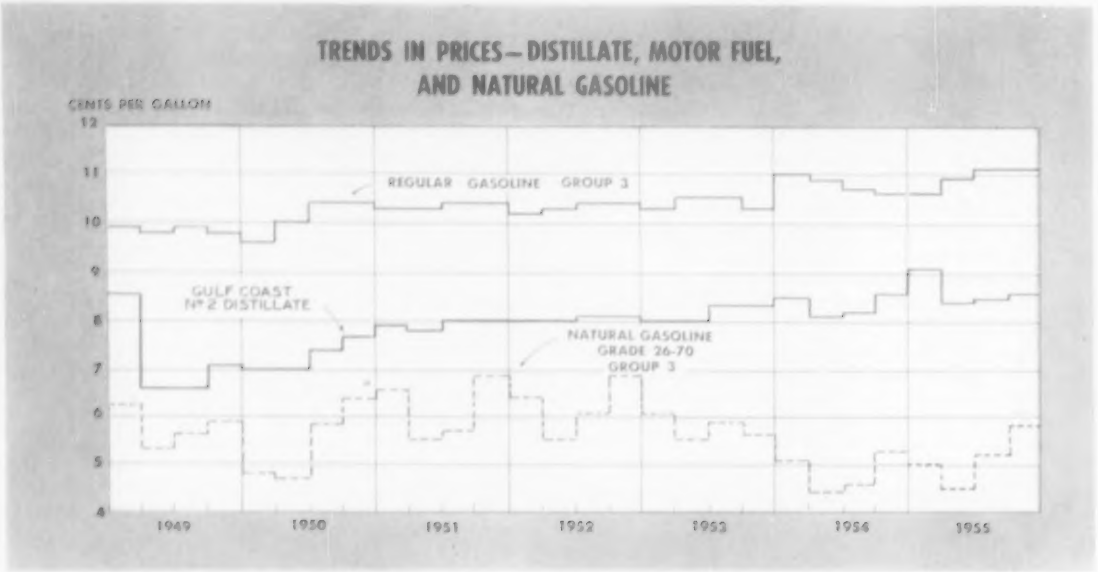
During the past year FPC has issued half a dozen or so opinions in individual cases. These point a trend. They indicate that FPC will apply its price-fixing authority to all gas that gets mixed up with the stream of interstate commerce, gas-well gas or casing-head gas, from the main transmission line back through processing and gathering to the wellhead, whether or not the actual owners of the gas in the reservoir have anything to do with setting the sales price or letting the gas get into interstate commerce.

When it comes to a formula for fixing field prices, FPC is groping. It is on record as saying that the utility type of cost accounting is unsuitable for gas production. It made a try at writing a new "field price" formula in the Panhandle Eastern case, but quite recently a Circuit Court threw this out and told the commission to try again.

New approach? . . . Some deep thinkers among gas producers are now hard at work on new formulas for determining producing costs, formulas which they think may be acceptable to the commission and the courts but which will give them sales prices which will compensate them for the risks of wildcatting and producing. They think that FPC will be receptive to such new ideas, but they know that there will be stiff opposition from consumers 'attorneys at every step.

So there will be months, probably years, of uncertainty, argument, and litigation.

In the meantime, of course, no producer will contract new gas supplies to an interstate market if he can afford to hold it for a while or can find an intrastate buyer. He's still the low man on the totem pole.



Major-product inventories drop 5 million barrels, thus . . .

Prices Improve Some; Demand Up 7.8 Per Cent

REFINED-PRODUCT market changes in 1955 again were related to shifts in product inventories. The small improvement in average prices can be credited to lower inventory levels by the end of the year than at the end of 1954.

The failure of markets to make still more important gains can be traced to variations in stock gains by products and to a few unusual seasonal shifts.

Primary stocks of the four major products (gasoline, kerosine, distillate fuels, and residual) totaled about 5,000,000 bbl. less at the end of 1955 than at the start of the year. Despite the fact that residual fuel accounted for a drop of better than 12,000,000 bbl. during the year, the resulting increase for other products was very small compared with the gains in product demand.

Total demand for all products increased over 7.8 per cent in 1955. In the past, it has been shown that increases in demand could be met with smaller percentage gains in inventories. But, even an increase of 5.0 per cent in major product stocks in 1955 would have meant an addition of about 17,000,000 bbl.

Demand for residual fuels in 1955 was up better than 6.5 per cent from 1954, but primary stocks dropped about 12,000,000 bbl. during the year. This lack of balance between supply and demand made residual the strongest major product for the year.

Production of residual fuel in this country does not vary directly with residual demand because of the below-cost price. For the first 10 months of 1955, United States refiners made 2,318,000 bbl. less residual than in the same months of 1954 despite an increase of 152,888,000 bbl. in refinery runs.

Part of the missing heavy fuel went to asphalt and coke. Refinery production of asphalt and road oil for the first 10 months was up by 8,366,000 bbl. Total coke production, marketable and catalytic, increased 3,349,000 bbl.

Gasoline Market Fluctuated Widely

Big increases in refinery runs and very high demand for gasoline produced some wide fluctuations in the gasoline market in 1955. An all-time record was set by gains in gasoline inventories during the first quarter of 1955, and this was followed by a near-record drop in the second quarter. Primary gasoline stocks gained 28,572,000 bbl. in the first 3 months of the year or 5,147,000 bbl. more than in the same quarter of 1954. The big first-quarter gain was followed by a reduction of 26,533,000 bbl. in the second quarter. The only period of greater reduction was in the second quarter of 1952 during the prolonged refinery strike.

These rapid stock changes were reflected in the gasoline market. The spot price for regular-grade gasoline on the Group 3 market moved up by as much as 1.0 cent a gallon between the end of March and the end of July. High-level demand for gasoline in the late months of the year prevented any serious drop in gasoline prices despite sharp increases in gasoline stocks.

Gasoline quality improved during the year. Part of the increased cost of making higher-octane fuel was covered by larger spread between regular and premium prices at the refinery level. For example, in the first quarter premium gasoline on the Group 3 market sold for only 1.0 cent a gallon more than regular with some sales reported at only 0.75 cent over. By the end of the year, the spread had increased to 1.5 cents.

In general, gasoline markets were stable after the first quarter. The only important exception was in the upper East Coast where service-station price wars prevented normal gasoline marketing in New Jersey and parts of New England.

One of the small accompanying charts shows trends in gasoline inventories. If the rapid buildup of stocks

continues throughout the first quarter, the result will be pressure on gasoline markets by the end of March.

There were several disturbing factors in the distillate market during 1955. Weather had been cold during December of 1954, and secondary suppliers were keeping their tanks well filled. The period of warm weather in January slowed up purchases and softened primary markets.

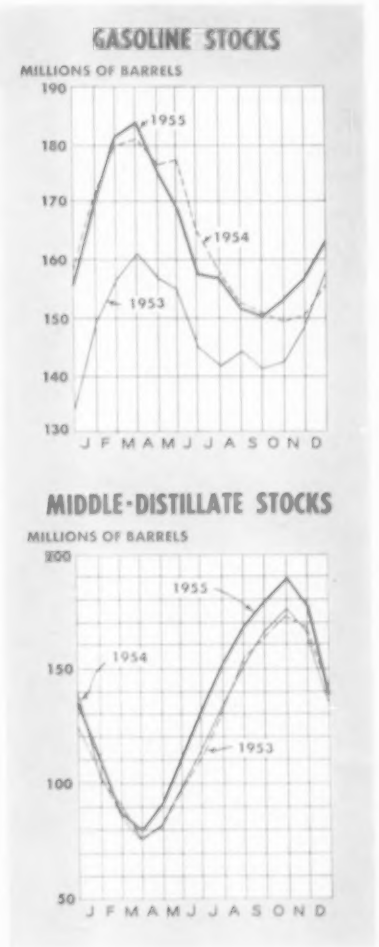
In the Mid-Continent, pipeline demurrage charges caused some Group 3 suppliers to dump some pipeline material on northern markets. The result was lower spot prices despite the increased demand in February.

On the accompanying chart, note that middle-distillate stocks were well above the 1954 level from the end of March through November. Part of this increase was due to the fact that distillate stocks in 1954 did not show any gain over 1953. However, this continuing picture of large inventory gains tended to depress distillate markets.

In the last quarter of 1955, the sharp upturn in tanker rates hindered spot sales on the Gulf Coast until cold weather pulled down inventories on the East Coast enough for prices to advance. Only in New York was the average of December lows for No. 2 fuel above the average for January. However, the market was strengthening at the end of the year, and prices in the first week of 1956 were above year-earlier quotations on both the Gulf Coast and Group 3 markets.

Natural-gasoline prices were stronger in 1955. The Group 3 low for the year was 4.5 cents a gallon compared with 4.0 in 1954. Also, the price started back up earlier in the summer than in most years. The normal time for the first increase of the summer is sometime in August. In contrast, 1954 Group 3 prices increased 0.5 cent a gallon on June 29. The North Texas price for Grade 26-70 moved up to 5.5 cents a gallon on November 1. The Group 3 market was strong enough to support a 6.0-cent price, but since this was the break point on gas contracts and since a 6.0-cent price netted less than 5.875 cents because of increased gas cost, quotations fluctuated between these levels during November and December.

Pennsylvania Grade crude advanced $0.50 a barrel in four steps during the year, and heavy crude in California was raised on a sliding scale with a maximum of $0.10 a barrel. Illinois basin crude stabilized at $3.00.



REPRESENTATIVE PRODUCT PRICES

Spot Market Quotations of Leading Suppliers

(Cents per gallon except dollars per barrel for residual)

GROUP 3

	Regular gasoline	Kerosine	No. 2 distillate	No. 6 residual
January	*10.28-11.00	9.75-9.88	8.88-9.00	$1.50-1.60
February	10.25-11.00	9.66-9.88	8.78-9.00	1.50-1.60
March	10.25-11.00	9.52-9.78	8.75-9.00	1.50-1.60
April	10.38-11.06	9.50-9.75	8.75-9.00	1.55-1.64
May	10.75-11.25	9.50-9.75	8.75-9.00	1.62-1.70
June	10.75-11.25	9.30-9.62	8.48-8.80	1.72-1.79
July	10.81-11.25	9.25-9.50	8.25-8.50	1.75-1.85
August	11.00-11.25	9.25-9.50	8.25-8.50	1.75-1.85
September	11.00-11.25	9.25-9.50	8.25-8.50	1.75-1.85
October	11.00-11.25	9.25-9.50	8.25-8.50	1.75-1.85
November	11.00-11.25	9.25-9.50	8.25-8.50	1.75-1.85
December	11.00-11.25	9.56-9.84	8.56-8.84	1.89-2.01
Average	**10.71-11.17**	**9.42-9.67**	**8.52-8.76**	**1.67-1.77**

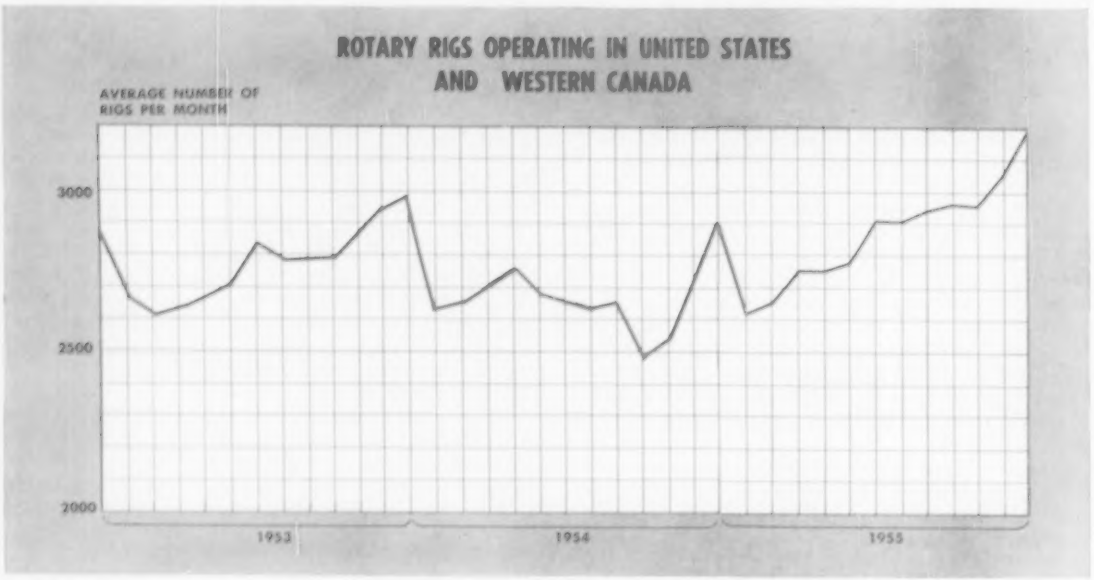
GULF COAST

January	†10.50-10.75	9.50-9.75	9.00-9.25	$1.85-1.95
February	10.50-10.75	9.50-9.75	9.00-9.25	1.90-2.00
March	10.45-10.75	9.50-9.75	8.95-9.22	1.95-2.00
April	10.25-10.75	9.25-9.38	8.69-8.88	1.95-2.00
May	10.25-10.75	8.81-9.00	8.31-8.50	1.95-2.00
June	10.25-10.75	8.50-8.75	8.00-8.25	2.00-2.05
July	10.31-10.75	8.50-8.75	8.00-8.25	2.05-2.18
August	10.50-10.75	8.70-8.95	8.50-8.75	2.10-2.25
September	10.50-10.75	8.75-9.00	8.50-8.75	2.10-2.21
October	10.50-10.75	8.75-9.00	8.50-8.75	2.10-2.20
November	10.50-10.75	8.75-9.00	8.50-8.75	2.10-2.20
December	10.44-10.75	8.63-9.00	8.31-8.81	2.10-2.20
Average	**10.41-10.75**	**8.93-9.17**	**8.52-8.78**	**2.01-2.10**

NEW YORK HARBOR (Barge)

January	‡11.25-12.00	10.70-10.70	9.95-9.95	$2.35-2.45
February	11.25-12.00	10.70-10.70	9.95-9.95	2.35-2.45
March	11.25-12.00	10.60-10.70	9.95-9.95	2.30-2.45
April	11.25-12.00	10.45-10.48	9.72-9.80	2.35-2.45
May	11.25-12.00	10.05-10.05	9.30-9.30	2.35-2.45
June	11.25-12.00	10.05-10.05	9.30-9.30	2.35-2.45
July	11.31-12.00	10.05-10.05	9.30-9.30	2.46-2.62
August	11.50-12.00	10.20-10.20	9.45-9.45	2.62-2.82
September	11.50-12.00	10.30-10.30	9.55-9.55	2.58-2.80
October	11.50-12.00	10.24-10.24	9.55-9.55	2.55-2.75
November	11.50-12.00	10.15-10.25	9.65-9.75	2.57-2.75
December	11.62-12.00	10.55-10.55	10.05-10.05	2.65-2.78
Average	**11.37-12.00**	**10.34-10.36**	**9.64-9.66**	**2.46-2.60**

*86 octane. †87 octane. ‡87 octane, unbranded.



From low of 2,574 to a high of 3,338 . . .

Rotary-Rig Use Hits New All-Time Peak

by Neil Williams

THE past year's greatly increased drilling activity, recorded elsewhere in this issue, brought into use the largest number of rotary rigs ever operated in the United States and western Canada.

At the peak, in mid-December, there were 3,338 rotary rigs running, 157 more than the previous all-time record of 3,181 rigs reported busy late in December 1951, 4 years ago. Not since the 1951 high, until now, has the number even reached the 3,100 level.

Based on weekly figures, operating rigs during the year averaged 2,856, also a record. This average exceeded that of 1954 by 199 rigs, and that of 1952, the previous record year, by 41 rigs.

At the close of the year, the number of rigs had dropped sharply from the 3,338-rig peak, following normal seasonal trends, to slightly above 3,000 rigs, but this still was about 340 rigs above the number running at the beginning of the year.

The 1955 average was with a range from a low of 2,574 active rigs early in January to the December all-time peak of 3,338 rigs, a difference of 764 rigs. The number reached the 3,000-rig level in September, the first time since December 1953. Even in 1953, it was only during a 3-week period in December that there were more than 3,000 rigs running. The highest number reported at any time in the following year (1954) was only 2,963.

Rotary-drilled wells completed in the United States and western Canada during 1955 totaled 51,307. With the average number of active rigs at 2,574, this represented an average of 17.9 wells drilled per rig. In 1954, with 48,416 rotary-drilled wells, the average was 18.2 wells per rig. The 1953 average was 16 wells per rig.

More than 700 rigs were running on the Gulf Coast at mid-December, more than 25 above the previous record of 676 rigs reported late in 1951.

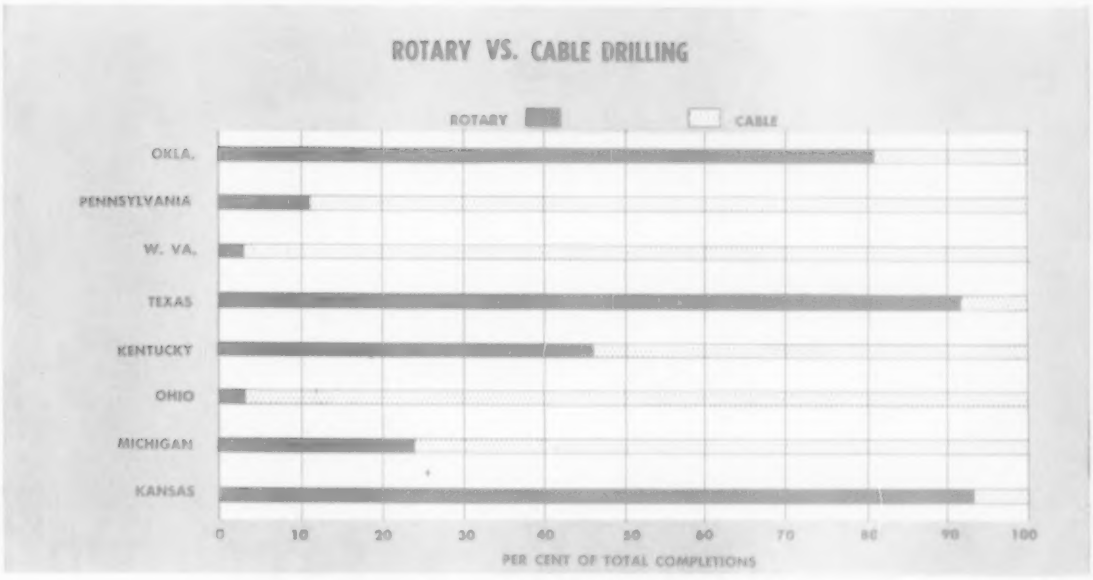
In the North and West Texas-New Mexico area, the number passed the 1,000 mark again, early in December, and reached a high of 1,078 rigs. The previous record, late in 1951, was 1,075 rigs. Not since May 1952 have more than 1,000 rigs been running in this region.

Drilling in the Rocky Mountain region reached a peak in August with more than 315 rigs. Prior to this year, the record was 303 rigs reported running late in 1953. Activity this year has been holding at a fairly steady high level with the number of active rigs hovering around the 300 mark at various times. In western Canada, the top number reported during the year was 218, in August. This was 6 above the 1954 all-time peak of 212 rigs.

DISTRIBUTION OF ACTIVE ROTARY RIGS*

	1955		1954		1951†	
Area—	Rigs	Per cent of total	Rigs	Per cent of total	Rigs	Per cent of total
Gulf Coast	678	22.0	602	21.3	643	21.0
N. & W. Tex.-N. M.	1,004	32.5	812	28.7	1,063	34.7
Ark.-N. La.-E. Tex.	186	6.0	197	7.0	191	6.2
Oklahoma	307	10.0	308	10.9	357	11.6
Kansas-S. Nebraska	178	5.8	177	6.2	171	5.6
Illinois-Eastern	130	4.2	139	4.9	126	4.1
Rocky Mountains	258	8.4	249	8.8	168	5.5
Pacific Coast	143	4.6	150	5.3	179	5.8
Total U. S.	**2,884**	**93.5**	**2,634**	**93.1**	**2,898**	**94.5**
Western Canada	200	6.5	196	6.9	162	5.5
Total	**3,084**	**100.0**	**2,830**	**100.0**	**3,060**	**100.0**

*Based on Hughes Tool Co. figures for last week of respective years. †Peak year prior to 1955.



Oklahoma retains lead in standard-tool wells, in 1955 . . .

Rotaries Drill 85.7, Cable Tools 14.3 Per Cent

A SURVEY of 1955 drilling operations revealed that approximately 14.3 per cent of all wells drilled in the United States were put down with cable tools. Rotary tools drilled the remaining 85.7 per cent. These figures are identical with 1954 percentages.

These 1955 percentage figures are based on an estimated 8,254 cable-tool completions versus 48,428 rotary-tool completions. Total well completions in the country soared to a new high of 56,682.

A substantial increase in cable-tool drilling was noted in Texas. That state recorded 1,480 wells completed with cable tools. This cable-tool drilling is primarily concentrated in West Texas counties. Some was reported in north and west-central areas.

There was little change in cable-tool operations in Kansas and Oklahoma. Oklahoma reported 1,654 cable-tool wells, Kansas 385. This cable-tool drilling was heavily centered in the shallow northeastern counties of Oklahoma—Nowata, Washington, eastern Osage, Tulsa, Wagoner, Muskogee, Rogers, Craig, and Creek.

In Kansas cable-tool drilling centered in the eastern stripper areas of the state. The shallow drilling boom in these two states that began in 1954 gained even more momentum during 1955. Particularly active were the old areas in Nowata, Washington, and Tulsa counties in Oklahoma.

The accompanying table details the number of cable and rotary-tool completions by states in 1955. The graph shows the percentage of cable-tool versus rotary-tool completions.

Oklahoma had the highest number of cable-tool completions—1,654. Rotary operators finaled 6,757 wells in that state. Ohio reported 1,226 cable-tool completions. New fracturing processes have boosted Ohio's well completions in the past 2 years.

Kentucky reported an increase of almost 100 per cent in cable-tool completions as a result of the big shallow play in Christian County and other western areas. Eastern Kentucky drilling was up in 1955.

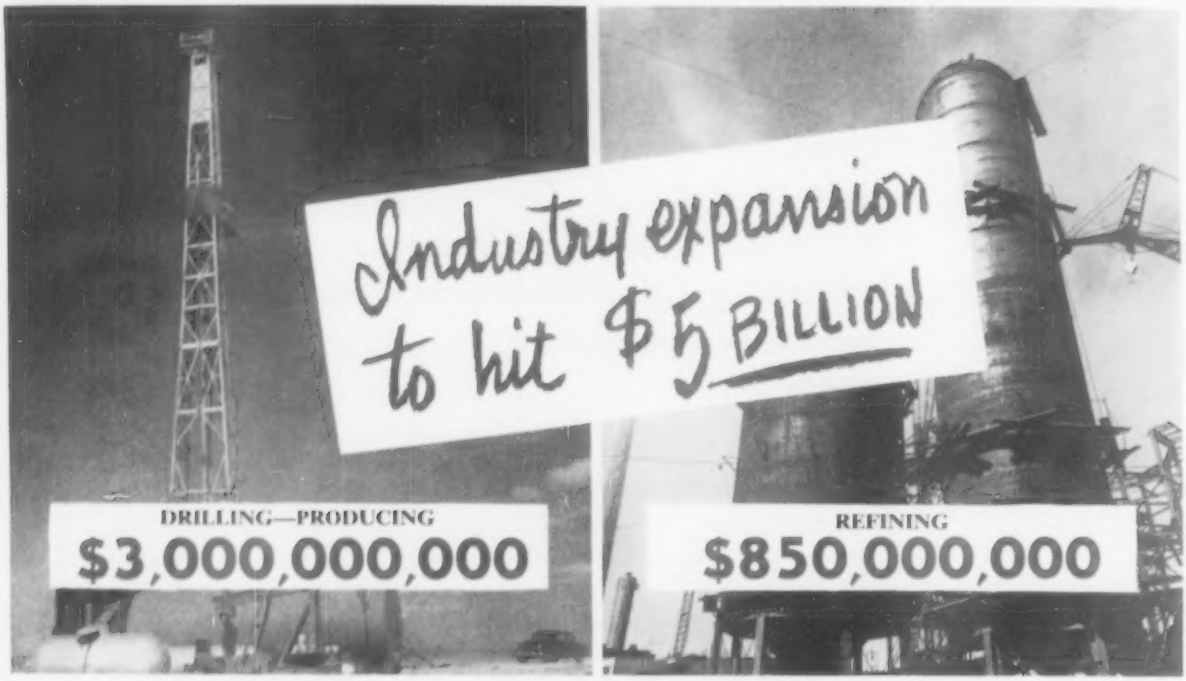
West Virginia had 621 cable-tool completions; Pennsylvania 638. There is a gradual increase in rotary rigs operating in the Appalachian province. This has been brought about by the expanded gas search in the deeper areas of New York and Pennsylvania.

A boom in drilling in the Eastern Interior province boosted Illinois' cable-tool completions to 258.

COMPARISONS OF CABLE TOOL AND ROTARY COMPLETIONS—1955

State—	Cable	Rotary	Total completions
Alabama	5	36	41
Arkansas	42	762	804
California	23	2,442	2,465
Colorado	0	1,509	1,509
Florida	0	30	30
Illinois	258	3,634	3,892
Indiana	118	588	706
Kansas	385	4,573	4,958
Kentucky	861	731	1,592
Louisiana	0	4,019	4,019
Michigan	390	122	512
Mississippi	0	448	448
Montana	14	397	411
Nebraska	9	882	891
New Mexico	75	1,588	1,663
New York	370	8	378
North Dakota	0	250	250
Ohio	1,226	33	1,259
Oklahoma	1,654	6,757	8,411
Pennsylvania	638	79	717
South Dakota	0	16	16
Texas	1,480	18,501	19,981
Utah	6	86	92
West Virginia	621	19	640
Wyoming	47	868	915
Miscellaneous*	32	50	82
Total 1955	**8,254**	**48,428**	**56,682**
Total 1954	7,715	46,215	53,930

*Inc. Missouri, Iowa, Idaho.



1956 BUDGETS INCREASED 22 PER CENT . . .

by Kenneth B. Barnes
Editor

THE United States oil industry this year has budgeted some $4,471,000,000 for capital items. Natural gas has set up $1,205,000,000 for investment.

All told, this hits a whopping $5,676,000,000, which figure is up $1,029,000,000 or 22 per cent over 1955. The natural-gas-industry expenditure for 1956 is up $205,000,000 or 20 per cent. The difference between the two figures, $4,471,000,000, is the estimated expenditures for 1956 for drilling-producing, refining, transportation, and marketing. It is up $824,000,000 or 22.6 per cent from last year.

The 1956 estimates for drilling-producing, refining, marketing, and transportation were obtained by The Oil and Gas Journal in this manner:

We asked a substantial cross-section of representative companies east, north, south, and west, what their budgeted capital expenditures were. These figures were sent by the company presidents or comptrollers to the Journal, on a confidential basis, to formulate a sum total representing a majority of the industry.

Next the net crude-oil production for each of the contributing companies was obtained and the totals added for all of the companies represented. In the analysis, the computed ratio between the companies' total net production and the U. S. total net production was used as a "drilling-production" index to obtain an estimated 100 per cent U. S. industry figure for capital expenditures in drilling-production.

In refining, similar computations were made by the Journal, with the ratio index being based on refining throughputs for the companies contributing their confidential budget estimates. Similar procedures were used in the transportation category. In marketing, the ratio index was based on the U. S. sales of petroleum products by the companies involved.

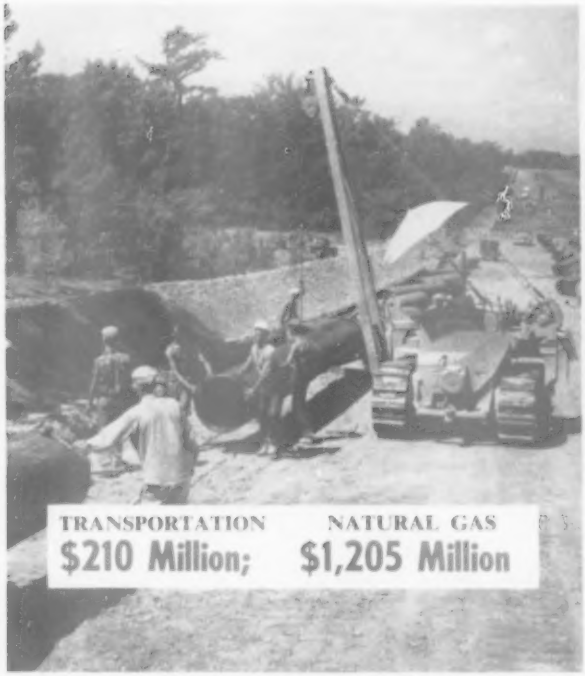
THE OIL AND GAS JOURNAL'S STUDY OF 1956 OIL-GAS CAPITAL EXPENDITURES (BUDGETED)
(In millions of dollars)

Industry division—	1956	1955
Drilling-Producing	$3,000	$2,453
Refining	850	720
Transportation	210	179
Marketing and other	411	295
Gas utilities-Gas pipelines	1,205	1,000
Total U. S. oil-gas industries	$5,676	$4,647

The majority of the U. S. oil and gas companies surveyed here plan increased expenditures for 1956. Part of this is based on increased activities, more wells, plant additions, more pipelines—and a smaller part is based on increased costs involved in doing business in 1956.

Capital Cost Items

Crude oil is definitely getting harder to find, and more wells have to be dug, and more of these wells are deeper. Refining processes and refining units in 1956 will be even more complicated and more expensive. A very definite contributor to this is the perpetual octane race. In transportation, some new lines will be laid and there will be a number of short extensions and loops in 1956. Additionally,



All industry divisions share in expansion plans . . .

more efficient pumps and prime movers will replace obsolete equipment in some of the older pipeline systems. Much service-station renovation, and also additions to terminals will be conducted this year in the marketing division.

It is to be emphasized that the Journal's estimated capital expenditures shown in these pages are confined entirely to the continental United States, the 48 states. No planned expenditures are included for United States companies' operations in South America, Europe, or the Middle and Far East. Likewise, no dollars figures are included for operating accounts. (For details of international activities in drilling, refining and pipelines for 1956, see the Journal's "World-Wide" section, pp. 141-198, December 26, 1955, edition.)

The gas-industry estimate for gas utilities and pipeline companies—$1,205,000,000—was prepared by the American Gas Association (detailed figures concerning natural-gas expenditures, pipeline additions, etc., are given in the Journal article, pp. 58-59, January 2, 1956, issue).

Industry Statements

A host of generally optimistic statements have been released by the industry's leaders this month. All anticipate oil demand will keep on expanding, and that oil and gas business prospects are good. Many of the companies plan activities and expenditures somewhat higher than 1955, and in cases there are some sharp increases in the oil drilling-producing division. A few companies have notable increases in their refining budgets. Following are two statements from oil-company presidents, reflecting the oil and gas situation for 1956:

L. F. McCollum, president, Continental Oil Co.: "The level of general business in the last quarter of 1955, which reached an all-time high, should carry over well into 1956. The best business periods should be in the first half of 1956, with the year as a whole expected to be somewhat better than 1955. Although purchases of automobiles will undoubtedly lag behind 1955 levels, total spending by individuals should maintain its upward trend of recent years.

"It is anticipated that United States petroleum demand, including exports, will be approximately 9,000,000 bbl. daily during 1956. This represents an increase of 3.7 per cent over last year. Domestic demand should increase approximately 4 per cent."

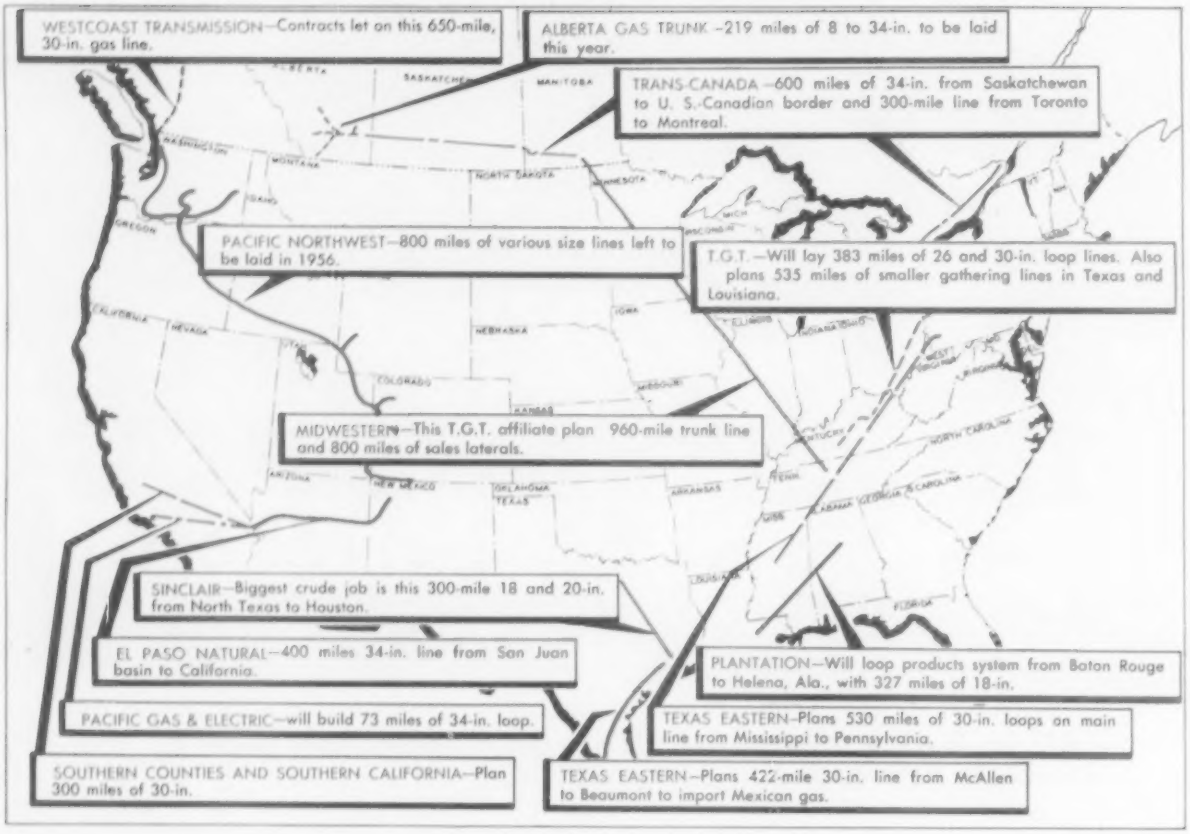
Reese H. Taylor, president, Union Oil Co.: "Total petroleum demand on the West Coast reached an all-time high in 1955. Unfortunately, when the final figures are recorded, total demand for 1955 will show an increase second only to the phenomenal 11.3 per cent growth in demand for 1950. Supply, on the other hand, failed to keep up with demand for the third time during the same period. While the resulting decrease in over-all inventory was desirable, the adjustment for one major product was just short of being drastic.

"One of the most spectacular developments during 1955 was the heavy withdrawal from stocks of residual fuel oil. Long a perennial problem because of oversupply, vigorous demands in the face of declining refinery yields of fuel oil changed the problem to one of undersupply.

"The year 1955 saw a very significant change in the foreign trade position of the West Coast petroleum industry. For the first time this area imported more oil than it exported."

U. S. BUSINESS (ALL INDUSTRIES) BUDGETS FOR 1956
Per cent increase, first quarter 1956 over 1955 rate
(Data, U. S. Dept. Comm.)

Manufacturing	18
Durable goods	25
Nondurable goods	12
Mining	3
Railroads	55
Other transportation	3
Public utilities	5
Commercial and others	5
Total	12


WESTCOAST TRANSMISSION—Contracts let on this 650-mile, 30-in. gas line.
ALBERTA GAS TRUNK—219 miles of 8 to 34-in. to be laid this year.
TRANS-CANADA—600 miles of 34-in. from Saskatchewan to U. S.-Canadian border and 300-mile line from Toronto to Montreal.
PACIFIC NORTHWEST—800 miles of various size lines left to be laid in 1956.
T.G.T.—Will lay 383 miles of 26 and 30-in. loop lines. Also plans 535 miles of smaller gathering lines in Texas and Louisiana.
MIDWESTERN—This T.G.T. affiliate plan 960-mile trunk line and 800 miles of sales laterals.
SINCLAIR—Biggest crude job is this 300-mile 18 and 20-in. from North Texas to Houston.
EL PASO NATURAL—400 miles 34-in. line from San Juan basin to California.
PACIFIC GAS & ELECTRIC—will build 73 miles of 34-in. loop.
SOUTHERN COUNTIES AND SOUTHERN CALIFORNIA—Plan 300 miles of 30-in.
PLANTATION—Will loop products system from Baton Rouge to Helena, Ala., with 327 miles of 18-in.
TEXAS EASTERN—Plans 530 miles of 30-in. loops on main line from Mississippi to Pennsylvania.
TEXAS EASTERN—Plans 422-mile 30-in. line from McAllen to Beaumont to import Mexican gas.

Good in 1955—even better in 1956—that's the story as . . .

Pipelines Expand in All Three Divisions

by Robert G. Deering

AFTER having experienced a very good year in 1955, pipeline constructors can look for an even better one in 1956. As usual, big gas lines lead the parade of announced projects, defying pessimists who claim each year that an end is in sight to the gas-construction program.

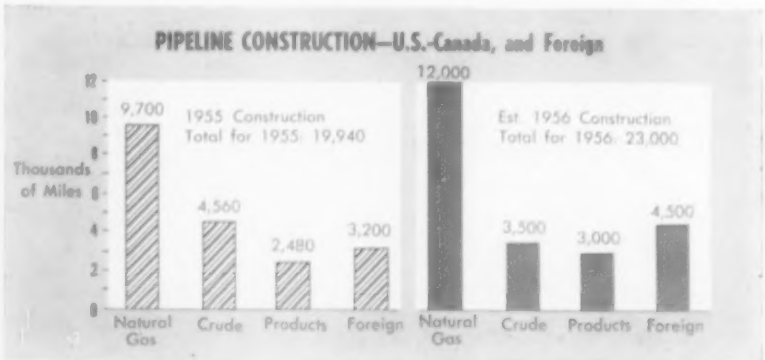
Counting both United States and Canadian jobs, there are already over 12,000 miles of gas-transmission lines either under way, approved, or submitted to governmental bodies for approval.

Mileage for crude and products lines announced so far this year for the U. S. is quite low. Of these announced only about 1,000 miles appear certain to be started. However, based on past records, the industry can expect about 5,000 miles of crude and products trunk line to be laid in 1956.

Foreign construction will take an upward turn this year with heavy emphasis on products lines. About 4,500 miles of line will be built outside the United States and Canada in '56, about 2,300 being for products.

Natural-Gas Lines

Biggest project set for this year is the start of Trans-Canada Pipe Line, Ltd.'s, huge system. Many of the big problems have been overcome and complete financing appears assured. Latest development is the tentative agreement of the Canadian Government and the Ontario provincial government to pay for laying 675 miles of line between Manitoba and eastern Ontario. The



only string attached is that Trans-Canada must complete financing of the remainder of its system by May 1.

If this can be done, work will start this summer on 600 miles of 34-in. from Alberta to Emerson, Man., and another 300 miles of smaller line between Toronto and Montreal. Alberta Gas Trunk Line, Ltd., the big gathering system for Trans-Canada, will also start this year. First phase of construction on the gathering system calls for 219 miles of 8 to 34-in.

Closely tied to Trans-Canada's plans is the proposed United States outlet at Emerson, Man., where 200 M.M.c.f.d. of gas would be sold to Midwestern Gas Transmission Co. This company, a subsidiary of Tennessee Gas Transmission Co., has asked FPC permission to build a 12, 16, and 24-in. line from near Emerson to Portland, Tenn., where it would connect with T.G.T.'s system. Total mileage for the Midwestern system is 1,660 in pipe sizes up to 24-in. The company plans to sell in the Midwest the gas received from Trans-Canada plus another 200 M.M.c.f.d. received from T.G.T. at Portland.

The other big Canadian gas project that has been held off for some years will also kick off this spring. This is the 650-mile trunk line of Westcoast Transmission Co., Ltd., a line to get Peace River gas into the northwestern United States.

Westcoast's line will connect at the United States border with Pacific Northwest Pipe Line Corp.'s system. About 800 miles of that system remains to be laid and all will be in the ground by the end of 1956.

Another big trunkline to California will be completed by El Paso Natural Gas Co. this year. This is a 400-mile, 34-in. line from the San Juan basin to Topock, Ariz. It will parallel existing 24 and 30-in. lines.

In connection with the above project are two planned California lines. Southern Counties Gas Co. and Southern California Gas Co. will build a single 300-mile 30-in. line from Topock to the Los Angeles area. Work will start this year. Pacific Gas & Electric Co. will lay 135 miles of 34-in. loop along its Topock-Milpitas, Calif., line; 73 miles being laid this year.

Big looping programs . . . T.G.T.'s planned looping in '56 calls for 383 miles of 30 and 24-in. along its main line through Kentucky and Ohio. The Federal Power Commission has approved 221 miles of the program. T.G.T. also plans to lay 535 miles of 4 through 24-in. gathering lines in the coastal area of Louisiana and Texas.

Texas Eastern also plans a big looping program, including 530 miles of 30-in. along its Kosciusko, Miss., to Uniontown, Pa., main line. Application has been made to FPC for this project. The company has also asked permission to build a 422-mile 30-in. line from McAllen to Beaumont, Tex., for importing of Mexican gas. Texas Eastern recently contracted with Petroleos Mexicanos for about 200,000 M.c.f.d. and must have the new line as well as the loops to transport it.

Work will be finished in '56 on two important lines started last year. One is the 1,121-mile system of American Louisiana Pipe Line Co. of which about half remains to be laid. This line runs from South Louisiana to the Detroit area. The other is that of Colorado Interstate Gas Co. which will lay 240 miles of 22-in. in Wyoming.

The most imaginative of planned gas lines is that of the Offshore Gathering Corp. This company has applied to FPC for permits to build a 24, 26, and 30-in. line to gather gas from producers off the coast of Louisiana. It also plans a 20-in. crude line to parallel the gas line. Route of the lines would be about 25 miles off of and parallel to the Louisiana coast.

Northern Natural Gas Co. has applied to FPC for permits to lay over 600 miles of line this year. The program includes 374 miles of 10 to 24-in. trunk with the major project being a 170-mile 20-in. from St. Paul to Duluth, Minn.

A big project to bring gas into Florida was placed before FPC last year. This is the plan of Houston Texas Gas & Oil Co. who seeks permission to lay 960 miles of trunk line between Baton Rouge and Miami. The main line would have 530 miles of 30-in. with the remainder in sizes down to 12-in.

Closely tied with Houston Texas Gas & Oil's plan is a proposed line not yet before FPC. This is Coastal Transmission Co.'s 550-mile 30-in. from South Texas to Baton Rouge which would supply the Florida line.

Two conflicting proposals are before FPC over taking gas from the Wise County, Texas, area. Natural Gas Pipeline Co. of America wants to build a 350-mile 20 and 26-in. line from Wise County to Fritch, Tex., near Borger. Lone Star Gas Co. opposes this with a plan to supply Natural Gas Pipeline with a 230-mile 22 and 26-in. line from Cotton County, Oklahoma, to Fritch. Lone Star has an alternate plan for a 205-mile 20-in. line from Snyder, Tex., to Fritch.

Products and Crude-Oil Pipelines

Only a few big projects have been announced for products or crude-oil lines this year. Largest of these is the $23,500,000 looping program set by Plantation Pipe Line Co. The firm will lay 327 miles of 18-in. along its products system from Baton Rouge to Helena, Ala.

Sun Pipe Line Co. has announced a 110-mile 14-in. products line from Twin Oaks, Pa., to Newark, N. J., and Cosden Petroleum Corp. will lay a 100-mile 6-in. line from Big Spring to Abilene, Tex. About 110 miles of line in the Houston area is planned by Phillips Pipe Line Co. and Phillips Chemical Co.

The biggest project in products pipelining remains the reconversion of the Little Inch from gas to products by Texas Eastern. This 20-in. line will go on stream this summer.

Sinclair Pipe Line Co.'s 300-mile 18 and 20-in. line from North Texas to Houston features the crude-pipeline situation. Half the line will be laid this year and the remainder in 1957.

Another looping program on Lakehead Pipe Line Co. and Interprovincial Pipe Line Co. has been contracted and will start this spring. This work involves 120 miles of 24 and 26-in. in Canada, North Dakota, and Minnesota.

In the planning stage (See Natural Gas Lines) is a 350-mile 20-in. crude line off the coast of Louisiana by Offshore Gathering Corp.

Foreign Construction for '56

Foreign products pipelines to be built this year total about 2,300 miles. This includes an estimated 450 miles to be laid by the North Atlantic Treaty Organization in Europe. NATO will also build 450 miles of products line in Turkey, a line that started in 1955 but which has been held up by weather. No official mileage figures have been released on NATO work in Europe but analysis of contracts let and inquiries made of those concerned with the work show that about 700 miles of line was laid in 1955. This amount is included in the tabulations listed here.

Other big products projects include a 573-mile 10-in. from Ahwaz to Teheran, Iran, by National Iranian Oil Co. and a 485-mile products line in Spain by the U. S Defense Department. Work is also in progress on 370 miles of 8 and 12-in. products lines in Mexico.

Foreign gas and crude lines for '56 total about 2,200 miles, including 700 miles of 26-in. gas line in Russia. Other gas lines are: 188 miles of 16-in. in Pakistan, 211 miles of 12 and 16-in. in Mexico, and 177 miles of 20-in. to be built in Venezuela by Cia. Shell de Venezuela.

Biggest crude systems on tap are a 75-mile 24-in. line by Iraq Petroleum Co., Ltd., and a 150-mile 21-in. to be laid in Saudi Arabia by Arabian American Oil Co.

Refining Continues Expansion . . . Who and Where

These projects are building, on the boards, or are planning

American Oil Co. will complete its new refinery now under construction at Yorktown, Va., late this year. Project includes crude unit, catalytic cracking, catalytic polymerization, and treating facilities. Kellogg is designer and constructor for this 35,000-bbl. plant.

American is planning a delayed coking unit of 9,665 bbl. capacity for completion at Yorktown late this year. Designer and constructor is Lumus.

Also planned for the plant are a 7,600-bbl. Ultraformer, 7,600-bbl. naphtha-desulfurization unit, for completion late this year. Designer and constructor is Parsons.

Anderson-Prichard Oil Corp. plans to build a 1,000-bbl. Unifiner sometime this year at its Cyril, Okla., refinery. The unit will be designed and constructed by Blaw-Knox.

Aurora Gasoline Co. is making several additions to its Detroit plant this year. A 5,500-bbl. Platformer is being converted to a Rexformer at a cost of $500,000. Probable completion date is March. A 4,000-bbl., $1,500,000 fluid coking unit will be completed sometime this spring by Parsons.

Bankline Oil Co. now has under construction a 4,000-bbl. fluid coker at its Bakersfield, Calif., refinery. The $2,000,000 unit will be completed late in 1956 by Fluor. A catalytic reformer, costing $1,000,000 and rated at 4,000 bbl. is planned for completion in January 1957.

Bankline plans a sulfuric acid alkylation unit, capacity 1,500 bbl., for completion in July of this year. A 40-ton per day coker is due for completion in September.

Bay Petroleum Corp. is building these facilities at its Chalmette, La., refinery for completion in July: a 5,000-bbl., $1,800,000 Platformer; 4,000-bbl. crude-distillation column; 1,600-bbl. vacuum distillation column; a 1,600-bbl. thermal cracking visbreaking unit, and a 12,000-bbl. fluid catalytic cracking unit. The company plans a $70,000 revamp of its loading facilities by May.

Cal-Tex Refining Co. has contracted for an 1,800-bbl. Unifier for its Colorado City, Tex., plant, to be completed early in 1956. U.O.P. is the designer and Refinery Engineering is the constructor.

Carter Oil Co. now has under construction a 2,500-bbl. Hydroformer and a 6,900-bbl. Hydrofiner, both due for completion at the Billings, Mont., refinery this year. Fluor is constructing the units.

Cit-Con Oil Corp. is building an automatic wax-molding unit at its Lake Charles, La., plant. The 360,000-lb., $455,000 unit will be completed early this year.

Cities Service Oil Co. (Del.) is planning to expand the crude unit from 23,000 to 35,000 bbl., at its Ponca City, Okla., refinery. Probable completion for the U.O.P.-designed unit is January 1, 1957. A 6,000-bbl. Rexformer is planned for completion by January 1, 1957. Designer is U. O. P. and constructor is Procon.

Continental Oil Co. is building a $1,000,000 combination desulfurizer and reformer at its Billings, Mont., refinery. Capacity of the desulfurizer will be 7,400 bbl. and that of the reformer will be 2,500 bbl. Stearns-Roger will complete construction in February. The company is building a 1,500-bbl., $525,000 catalytic reformer for March completion at its Artesia, N. M., refinery. Refinery Engineering is constructor.

Cooperative Refinery Association, Coffeyville, Kan., is planning these units for August completion: a 2,000-bbl. increase for the cat-cracking unit and revamp of poly and gas-concentration units, all for $1,200,000.

Other facilities planned for the Coffeyville plant include a 5,000-bbl., $750,000 platformer, currently under construction by Southwestern Engineering. Completion date is May. A 3,000-bbl., $400,000 Unifiner now under construction by Southwestern Engineering will be completed at the same time. The company is building an 8,400-ton, $1,250,000 delayed-coking unit for September completion. U.O.P. is designer and Refinery Engineering is constructor.

Cosden Petroleum Corp. will build several units at its Big Spring, Tex., refinery. A 3,900-bbl., $2,500,000 Rexformer will be completed in June by Procon.

The company is currently revamping its catalytic cracker to up the capacity by 1,400 bbl., at a cost of $1,000,000. Work will be completed in April. Badger has contracted to build a styrene unit for December completion.

D-X Sunray is expanding the catalytic cracking unit by 5,000 bbl. at its Duncan, Okla., plant. Estimated cost is $250,000. Refinery Engineering will complete the construction in March. The company is planning a $700,000 addition to its gas-recovery facilities, to be completed in April, at its Tulsa refinery.

Derby Refining Co. is building a 2,500-bbl. Ultraformer at its Wichita, Kans., plant. The $750,000 unit was designed by Standard Oil Co. (Ind.) and is being constructed by J. F. Pritchard Co.

El Dorado Refining Co. of El Dorado, Kans., is building a $500,000, 2,500-bbl. Platformer, to be completed in March. El Dorado is doing the construction.

Golden Bear Oil Co. is planning these units at its Bakersfield, Calif., refinery: a 1,000-bbl. vacuum-distillation unit for 1956 or 1957; a 500-bbl. hydrogenation unit for 1956 or 1957; 1,500-bbl., $35,000 refractionator, and 1,200-bbl., $75,000 extension for the furfural extraction unit.

Humble Oil & Refining Co. has two active projects at its Baytown, Tex., plant. Capacity of the alkylation unit is being increased by 2,500 bbl. at a cost of $2,980,000. Work will be completed in May. The company is also spending $1,000,000 to rearrange its light-ends handling facilities. Work will be completed early this year.

Ingram Oil & Refining Co., Meraux, La., is planning two additions this year. A 3,000-bbl., $1,000,000 Platformer is planned for May completion. Southwestern Engineering is the constructor. Crude-unit revamp will add 12,000 bbl.

crude capacity at a cost of $600,000. Work will be completed in May. A 5,200-bbl. vacuum distillation unit is also being planned.

International Refinery, Inc., Wrenshall, Minn., is building these facilities at a cost of $1,400,000, to be completed by August: a Hydrofiner-Hydroformer combination unit of 2,800 bbl. capacity, additions to the crude unit, offsite tankage, and additions to utilities. Licensor for the hydrogeneration unit is Esso Research & Engineering, and Parsons is handling the major construction.

Magnolia Petroleum Co. is building these units at its Beaumont, Tex., refinery: A 36,000-bbl. T.C.C. unit to be completed this year by Bechtel; a 25,000-bbl. Sovaformer, also to be completed late this year by Bechtel; and a 26,000-bbl. light-hydrocarbon fractionator, to be completed early this year by Fluor.

Planned for the Beaumont plant in 1956 are a 15,000-bbl. expansion of the crude distillation facilities, lube-blending and packaging facilities, and a 240,000-gal. per day sanitary-sewage treating system. Planned for 1957 are a 30,000-bbl. Sovafining unit and a 8,000-bbl. HF alkylation unit.

Malco Asphalt & Refining Co. is planning a 3,400-bbl. T.C.C. unit; a 300-bbl. catalytic polymerization unit, and a 1,400-bbl. straightrun asphalt unit for its Artesia, N. M., refinery.

National Cooperative Refinery Association, of McPherson, Kans., is constructing a 5,500-bbl. Platforming unit for completion early this year. Refinery Engineering is the constructor. The company is planning a 1,550-bbl. HF alkylation unit for probable completion January 1, 1957. U.O.P. is the designer, and the constructor is not yet selected.

Osceola Refining Co., Inc. is planning a 2,500-bbl. atmospheric distillation unit for its Reed City, Mich., plant.

Pure Oil Co. is building a 15,000-bbl. Ultraformer at its Smiths Bluff refinery at Nederland, Tex. The unit, designed and under construction by Parsons, is scheduled for completion in May.

Queen City Oil & Refining Co., of Dickinson, N. D., is planning four units for completion late this year. A 1,200-bbl. fluid catalytic cracking unit, estimated to cost $1,300,000, has been designed by Refinery Engineering. Also planned are a 3,000-bbl. atmospheric-distillation crude unit; 1,200-bbl. vacuum unit, and a 100-bbl. thermal polymerization unit.

Rado Refining Co. is planning a 1,500-bbl. atmospheric-distillation crude unit for its McAllen, Tex., plant.

Richfield Oil Corp. is building a 17,000-bbl. catalytic reforming unit at its Watson, Calif., refinery. The unit, of Sinclair-Baker design and constructed by Parsons, is scheduled for May completion.

Sinclair Refining Co. is building a 24,000-bbl., $16,600,000 catalytic reforming unit at its Houston refinery. The Sinclair-designed unit is being constructed for March completion by Kellogg. The company is also building for April completion, a 130,000-bbl., $12,700,000 crude still at Marcus Hook, Pa. Parsons is building the Sinclair-designed unit.

Sioux Oil Co., of New Castle, Wyo., is building three units for completion early this year. A 750-bbl., $200,000 Houdriformer, designed by Litwin Engineering, is being built by the staff. The staff is also building a $60,000, 500-bbl. addition to the crude unit. A 125-bbl. L.P.G. setup should also be completed this year. The company is planning to build hydrogen-treating facilities.

Socony-Mobil Oil Co. has contracted with McKee for a Sovaforming unit to be completed in May at Buffalo. The company is building a Sovaforming unit at Paulsboro, N. J., for March completion by Fluor. A Sovaforming unit will be built by Bechtel, for April completion, at Trenton, Mich.

Socony has an alkylation unit, licensed by Kellogg and built by Braun, under construction at East Chicago, Ind., for February completion. The company has contracted with Stearns-Rogers for a T.C.C. unit to be completed in June at Casper, Wyo.

Somerset Refinery, Somerset, Ky., is building a $25,000, 350-bbl. Cycloversion unit for completion in March.

Standard Oil Co. of California is planning a $30,000,000, 30,000-bbl. complete refinery in Honolulu for 1957 completion.

Standard Oil Co. (Ohio) is building an 11,000-bbl., $5,000,000 Ultraformer at Cleveland for completion early this year. Fluor is designer and constructor.

Standard Oil Co. (Ind.) is building three units at Whiting, Ind., for completion early this year. Braun is designer and constructor for the 55,000-bbl. crude unit; Foster-Wheeler is designer and constructor for a heavy-oils modernization program, and Parsons is building a 14,000-bbl. Ultraformer designed by Standard.

Parsons is also building a 5,400-bbl. Ultraformer for completion late this year at Standard's Mandan, N. D., refinery. The company is planning modernization and expansion of its heavy-oils facilities at Casper, Wyo., sometime in 1957.

Sun Oil Co. is building a $1,200,000, 1,300-bbl. alkylation plant, for late spring completion, at Toledo. Sun is the designer and Catalytic is the constructor.

The Texas Co. is building a 25,000-bbl. furfural refining unit, and a 13,000-bbl. butane deasphalting unit at its Wilmington, Calif., plant. These units, designed and constructed by The Texas Co., are scheduled for midyear completion. The company is building a 4,800-bbl. Platformer for midyear completion at Casper, Wyo. Fluor is constructor. Scheduled for completion early this year is a 1,000-bbl. U.O.P. alkylation unit at Lockport, Ill. McKee is constructor.

Texaco's Westfield, N. J., plant is now undergoing a 10,000-bbl. expansion of its crude facilities. The project, designed and constructed by Texaco, will be completed late this year. An 8,500-bbl. expansion of the crude unit is also under way at Lawrenceville, Ill. This work, designed and constructed by The Texas Co., will be completed late this year. A new analytical and testing laboratory will be completed late this year at the Port Arthur, Tex., plant. Stone & Pitts designed the building and O. W. Collins constructed it.

Tide Water Associated Oil Co. is building a 42,000-bbl. coker at its Avon refinery for August completion. Bechtel is designer and constructor.

United Refining Co., Warren, Pa., is building a $50,000 laboratory for March completion. Beyer Construction is constructor. A $40,000 warehouse is planned for completion late this year.

Utah Oil Refining Co., Salt Lake City, is building a $3,000,000, 5,500-bbl. Ultraformer for May completion. Fluor is designer and constructor.

Vickers Petroleum Co., Inc., Potwin, Kans., is building a 16,800-bbl. atmospheric distillation crude unit, an 8,500-bbl. vacuum unit, and an 8,700-bbl. catalytic cracking unit for completion this year. The company is planning a catalytic reformer unit and a thermal cracking unit.

Wilcox Oil Co., Bristow, Okla., is planning a $50,000 addition to its tankage facilities to be completed early this year.

Petrochemical Building Curve Still Soars

Rubber, synthetic fibers, ammonia—all share in expansion projects

Rubber . . . Activity in building of synthetic rubber and associated facilities is sharply upward (El Paso-General Tire, Petroleum Chemicals, Petro-Tex., Phillips . . .) **Firestone** is upping its Lake Charles rubber plant from 100,000 to 150,000 long tons per year and its Akron facilities from 30,000 to 40,000 tons. **Goodyear** is expanding synthetic rubber at Houston to give a 50 per cent capacity increase in two stages. The first stage, to be completed in 1957, is increase from 135,000 to 170,000 tons at a cost of $6,000,000. The second stage will take capacity up to 200,000 tons yearly. **Texas-U. S. Chemical Port Neches** butadiene-copoly plant has awarded a contract for construction of copolymer facilities at Port Neches, Tex., to be completed by mid-1956. This, together with work completed previously, raises this plant's capacity by 35 per cent or about 35,000 long tons. **Goodrich** started a $2,500,000 expansion at Louisville to double production of special rubbers and latex, and is expanding tire and foam-rubber production facilities. **Goodrich-Gulf** (Port Neches rubber plant) is starting with production of latex, initially at a million pounds per month, and will install facilities in the near future to make triple this amount. **U. S. Rubber** has expanded latex capacity. **Shell Chemical** has started construction on cold high-solids latex facilities at Torrance, Calif.

Mobay Chemicals has brought on stream its polyester and isocyanates units at New Martinsville, W. Va. Nopco Chemicals has two new plants (Harrison, N. J., and Los Angeles) each with capacity of 3,000,000 lb. yearly for polyurethane foams, and is planning a third plant to begin building in 1956.

Synthetic fibers . . . Acrylic fibers are much in the news with **Du Pont** increasing Orlon capacity at Parlin, N. J., and Du Pont of Canada to build a new Orlon plant at Maitland, Ont. **Carbide** is making a 35 per cent increase in Dynel capacity. Canadian Industries, Ltd., has its new $22,000,000 Terylene plant operating at Millhaven, Ont. In nylon Chemstrand and Allied Chemical & Dye have plants in operation, the latter via caprolactam.

Ethylene-polyethylene . . . With its second big ethylene unit at Port Arthur, Tex., completed in mid-1955 **Gulf Oil Corp.** was considering another 60 per cent increase in ethylene capacity. It was stated that decision would be reached soon on construction of a third unit. Present ethylene capacity at Port Arthur is 365 million pounds per year. Meanwhile **Phillips Chemical Co.** is building a 120 million pound ethylene unit at Sweeny, Tex., to supply the large low-pressure polyethylene plant building on the Houston Ship Channel. **Brea Chemical** and **Koppers** are to build a low pressure polyethylene plant, perhaps adjoining the Union Oil refinery in the San Francisco area. **Esso Standard Oil Co.** has announced a large ethylene plant will be built at Bayway, N. J. and this might provide ethylene for **Hercules** polyethylene project (Ziegler process) considered for Parlin, N. J.

Ammonia . . . Heavy capital expenditures continue. Projects listed here include those based on non-petrochemical sources of hydrogen. This is done in order to give the reader an over-all picture of construction in the nitrogen products industry.

Who, What, Where in Organics?

New-plant projects and expansion programs are summarized in the following paragraphs:

American Cyanamid Co., Avondale, La. (Fortier plant): Methyl styrene plant reported under construction at cost of $8,000,000. Capacity 30,000,000 lb. per year. Completion mid-1956.

Brea-Koppers, California location: To build 50,000,000-lb. polyethylene (low-pressure) plant. Mid-1957 completion.

Carbide & Carbon Chemicals Co., Seadrift, Tex.: Doubling ethanolamines capacity. Completion in fall of 1956;

Texas City, Tex.: Doubling vinyl acetate capacity. Completion fall 1956;

Torrance, Calif.: Completing facilities for polyethylene, ethylene oxide-glycol. Should be on stream early 1956. Cost $36,000,000. Capacity 60,000,000 lb. per year polyethylene.

Celanese Corp. of America, Pampa, Tex.: Installing methyl ethyl ketone unit. Vinyl acetate facilities expanded in 1955;

Gallipolis Ferry, W. Va.: Tricresyl phosphate, plasticizers, intermediates. New plant under construction.

Commercial Solvents Corp., Sterlington, La.: New nitroparaffins plant on stream. Expanding nitroparaffins intermediates facilities at Terre Haute, Ind.

Cosden Petroleum Corp., Big Spring, Tex.: Building 20,000,000-lb. per year styrene monomer plant. Cost $3,000,000. Scheduled for December 1956.

Dow Chemical Co. of Canada, Ltd., Sarnia, Ont.: Reported to be building $4,000,000 ethylene and ethanolamines plant, also pentachlorophenol plant.

Dow Chemical Co., Velasco, Tex.: completed 36,000,000-lb. per year glycerine plant. Dow's Texas Division also completed polyethylene plant.

E. I. du Pont de Nemours & Co., Antioch, Calif.: Tetraethyl lead, ethyl chloride, trichlor-ethylene and perchlorethylene will be made in plant now under construction. Fluorinated hydrocarbons will be another product. Plant is scheduled for completion in early 1957;

Beaumont, Tex.: Building chlorosulfonated polyethylene facilities. For completion in early 1957. Present facilities at Beaumont make methionine.

El Paso Natural-General Tire, Odessa, Tex.: Joint venture of El Paso Natural Gas Co., and General Tire & Rubber Co. Planning new plant. El Paso is to build butadiene and styrene facilities. General Tire is to build 40,000 long tons per year GR-S facilities. Planned for completion by mid-1957.

Esso Standard Oil Co., Bayway, N. J.: Has announced ethylene plant. Will be first on East Coast. Capacity not given.

Foster-Grant Co., Baton Rouge, La.: Plan to expand monomer to more than double existing capacity to 50,000,000 lb. annually.

Hercules Powder Co.: Gibbstown, N. J.: Adding p-cresol unit for completion late 1956. Capacity 4,000,000

Another big round of ethylene-manufacturing facilities under way.

lb. per year. Considering low-pressure polyethylene on East Coast.

Parlin, N. J.: Planning $10,000,000 polyethylene plant by low-pressure (Ziegler) method. Capacity 30,000,000 lb. per year.

Louisiana, Mo.: Pentaerythritol $6,000,000 plant.

Hidalgo Chemical Co., Brownsville, Tex.: Stanolind Oil & Gas subsidiary rehabilitating former Carthage Hydrocol plant. Expect startup in spring or summer 1956.

Monsanto Chemical Co., Texas City, Tex.: Completed tert-butylamine unit.

Olin-Mathieson Chemical Corp., Brandenburg, Ky.: Expanding ethanolamines unit.

Petroleum Chemicals, Inc., Lake Charles, La.: Continental Oil Co., and Cities Service Co. Expansion started of butadiene plant, from 63,000 to 79,000 tons of butadiene per year. Cost $4,350,000. Completion fall, 1956.

Petro-Tex Chemical Corp., Houston: Tennessee Gas Transmission Co., and Food Machinery & Chemical Co. Present capacity 90,000 tons per year. Plan at least 50 per cent capacity increase over next 5 years.

Phillips Chemical Co., Borger, Tex.: Latest expansion in rubber-plant facilities: butadiene plant being expanded by 24,000 short tons per pear and copolymer plant by 30,000 long tons.

Sweeny, Tex.: Building 120,000,000-lb. per year ethylene plant. Cost reported at $12,000,000.

Adams Terminal (near Pasadena), Tex.: Constructing 110,000,000-lb. per year low-pressure polyethylene plant. Cost reported at over $30,000,000. Ethylene will come from Sweeny, Tex., refinery through 75-mile pipeline.

Polymer Corp., Sarnia, Ont.: Planning $6,000,000 expansion. Expansion by 7,000 tons per year.

Reichold Chemicals, Inc., Seattle: Completing expansion of pentachlorophenol to 6,000,000 lb. per year.

Richfield Oil Corp., Wilmington, Calif.: Has been operating semicommercial unit for phthalic anhydride.

Shell Chemical Corp., Houston: Completed synthetic glycerin expansion. Bisophenol-A facilities being completed, early 1956. Shell glycerin capacity at Houston now over 79,000,000 lb.

Martinez, Calif.: Completed expansion for antioxidant "Ionol" (trisubstituted phenol). Completing new unit for tert-butyl benzoic acid.

Norco, La.: New plant on stream making allyl chloride and chlorohydrins. These are shipped to Houston plant for making glycerin and epoxy resins. Shell plans 30,000,000-lb. glycerin facilities at Norco later—via new hydrogen peroxide-acrolein route. Epoxy units may be added in future also.

Norco, La.: Construction begun on 40,000,000-lb., methyl ethyl ketone facilities. Completion early 1957.

Sinclair Refining Co., Houston: Expansion of detergent lube-oil additives plant at cost of $2,200,000.

Standard Oil Co. of California, Richmond, Calif.: Completed isophthalic acid plant. Cost $7,000,000. Capacity 50,000,000 lb. (Oronite Chemical Co.).

Stauffer Chemical Co., Mobile Ala.: Building carbon disulfide plant, completion spring 1956.

Stepan Chemical Co. (subsid. Continental Oil Co.), Joliet, Ill.: Dimethylsulfoxide, sulfonate detergents. Completing facilities.

Texas Butadiene & Chemical Corp., Houston: Plans to build $26,000,000 plant for alkylate-avgas and butadiene. Houdry dehydrogenation of butanes to make butadiene, ranging from 17,000 to 43,000 tons depending on alkylate demand.

Texas Eastman Co., Longview, Tex.: Expanding capacity for normal and isobutyraldehydes. Completion fall of 1956.

Who, What, Where in Ammonia?

Allied Chemical & Dye Corp., Nitrogen Div., La Platte (Omaha) Neb.: Has planned to double basic capacity of plant, now 210 tons daily.

Ammonia Chemical Corp. of California, Merced, Calif.: Planning $3,250,000 plant near Merced.

Brea Chemicals, Inc., Browley, Calif.: Planning 25,000 tons per year ammonium phosphate solutions facilities.

California-Spray Chemical Co., Richmond, Calif.: Building facilities to make liquid and pelleted fertilizer products—will take ammonia from Standard Oil Co. of California plant now building at Richmond.

Calumet Nitrogen Products Co., north of Calumet Canal at Hammond, Ind.: Joint venture of Standard Oil Co. of Indiana and Sinclair Refining Co. to use byproduct hydrogen from cat reforming at the Whiting and East Chicago refineries, respectively. Daily capacity 300 tons anhydrous ammonia. Completion May 1956.

Canadian Industries, Ltd., Millhaven, Ont.: Ammonia plant, 200 tons daily. Cost $9,000,000. Will use fuel oil for hydrogen manufacture.

Chillicothe Chemical Mfg. Co., Chillicothe, Tex.: Status of this project uncertain. Planned at 180 tons ammonia. Urea manufacture.

Columbia River Chemicals, Inc., Pasco, Wash.: Originally announced 160-ton per day plant. Lately is reported to have abandoned plans.

Consolidated Mining & Smelting, St. Helens, Ore.: Has option on land for possible future ammonia-urea plant.

Escambia Bay Chemical Co., near Pensacola, Fla.: Formed by United Gas Corp., Electric Bond & Share Co., and National Research Corp. Capacity 200 tons per day. Completion spring 1956. This is a $30,000,000 project.

Gonzales Chemical Industries, Inc., San Juan, Puerto Rico: A $12,000,000 ammonia plant, 115 tons per day. Will use No. 6 fuel oil to make hydrogen by partial oxidation.

Ketona Chemical Corp., Tarrant, Ala.: Owned jointly by Alabama By-Products Corp., and Hercules Powder Co. Will use hydrogen from coke-oven gas. Capacity 120 tons per day ammonia.

Northern Chemical Industries, Inc., Searsport, Me.: Completion early 1956. Capacity 125 tons per day. Cost about $9,000,000. Will use Bunker C fuel to make hydrogen by partial oxidation.

Northwest Nitro-Chemicals, Ltd., Medicine Hat, Alta.: Financing $22,000,000 plant. Planned for production in early 1957 of nitrogen and phosphate fertilizers.

Petroleum Chemicals, Inc., Lake Charles, La.: Joint venture Continental Oil Co., and Cities Service Oil Co., for

possible future 275-ton per day ammonia plant near their respective refineries.

Phillips Pacific Chemical Co., Pasco, Wash.: Phillips Petroleum Co., and Pacific Northwest Pipeline Corp., to build 200-ton per day plant at cost of $20,000,000. Construction to start in Spring 1956 with completion for early 1957.

Shell Chemical Corp., Ventura, Calif.: Urea plant, 100 tons per day. Completion October 1956. Montecatini process.

Simpson Coal & Chemical Co., Natchez, Miss.: Reported planning of 160-ton per day ammonia plant as part of natural gas-to-acetylene plant also making vinyl chloride.

Sohio Chemical Co., Lima, Ohio: Dry ice plant (75-ton per day) will be completed in May 1956. Cost $800,000.

Southern Nitrogen Co., Inc., Savannah, Ga.: Will build 250-ton per day ammonia plant, also urea manufacture. Cost $14,000,000. Planned for late 1956 completion. Field work reported under way.

Southwest Agrochemical, Phoenix, Ariz.: Planning 50-ton per day plant for operation in 1957.

Spencer Chemical Corp., Vicksburg, Miss.: Nitric acid and ammoniating solutions facilities expanded. Completion spring 1956. Cost $1,500,000.

Standard Oil Co. of California, Richmond, Calif.: Will use in part cat reformer byproduct hydrogen. Capacity 300 tons per day ammonia. Cost $16,000,000. Completion mid-1956.

St. Paul Ammonia Products, Inc., St. Paul, Minn.: To build $16,000,000 plant scheduled for late 1956, 200-ton per day capacity. Part of hydrogen from Great Northern refinery.

Sun Oil Co., Marcus Hook, Pa.: Completing 300-ton per day plant. Uses byproduct hydrogen from two cat reforming units. Plant should be on stream as this is printed.

Thunderbird Chemicals Corp., Kyrene, Ariz.: Option on land. Plans $11,000,000 plant, 120 tons per day, also urea.

U. S. Steel Co., Provo, Utah: Hydrogen from coke-oven gas. Capacity 200 tons per day ammonia.

Ammonia Plants Completed

Dow Chemical Co., Freeport, Tex.: Doubled capacity of plant. Hydrogen byproduct from chlorine cells.

Food Machinery & Chemical Corp., South Charleston, W. Va.: Completed 60-ton per day plant (Westvaco Chlor-Alkali Div.) based on hydrogen from chlorine cells. Cost $2,500,000.

Mississippi River Chemical Co., Crystal City, Mo.: Plant on stream, 200 tons per day.

Sohio Chemical Corp., Lima, Ohio: Operating 300 tons per day, ammonia, 180 tons per day nitric acid and 120 tons per day urea (Inventa process). Carbon dioxide plant still building.

Who, What, Where in Carbon Black, Sulfur?

Cabot Carbon Co., Sarnia, Ont.: Will expand carbon black from 20,000,000 to 55,000,000 lb.

Canadian Gulf Oil Co., near Lethbridge, Alta.: Building 225-ton per day sulfur-extraction (from natural gas) plant. Completion September 1956. Plant 50 miles from Lethbridge. Gas from Pincher Creek field.

Columbian Carbon Co., St. Mary Parish, La.: Completing furnace-black plant with total capacity 60,000,000 lb. per year. Cost $3,000,000.

J. M. Huber Corp., Borger, Tex.: Planning expansion by 20-30 million pounds per year, completion latter part 1956, carbon-black facilities.

Montana Sulfur & Chemical Co., Billings, Mont.: Building 50-ton per day unit sulfur extraction from refinery gases from Carter and Conoco refineries at Billings.

Thermatomic Carbon Co., Sterlington, La.: Increasing carbon-black capacity by 15 per cent. Completion early 1956.

Union Oil Co. of Calif., Santa Maria, Calif.: To build duplicate of existing 40-50 ton per day sulfur unit using refinery gases.

Witco Chemical Co., Eunice N. M.: To build unit making 25,000,000 lb. yearly of semireinforced carbon black.

Field-Processing-Plant Building Ahead of 1955

UPTURN in construction of field processing plants is noted for 1956 as compared with last year. Natural-gasoline and cycling-plant projects are listed here. Carbon-black and sulfur-recovery plants are listed under petrochemical projects.

Arkansas Fuel Oil Corp. is building a 900-bbl. Platformer at its Panola gasoline plant, Carthage, Tex. It is scheduled for completion in May 1955.

Canadian Gulf Oil Co. is building a 15-M.M.s.c.f.d. gasoline plant in Alberta with probable completion in March 1956. Estimated cost: $3,500,000. Contractor is Mannix-Gill.

Carthage Co.: A 900-bbl. per day Platformer and a Platformer feed preparatory unit (100 bbl. isopentane per day) are under construction at Carthage, Tex., by Procon, Inc. Probable completion is May 1956.

Cities Service Oil Co. is revamping and modernizing its Wichita, Kan., gasoline plant. Probable completion April 1956. Cost is around $1,300,000. Underground storage capacity is being expanded. At Hutchinson, Kan., two caverns have been washed from about 27,000 bbl. to 50,000 bbl. each. Ultimately there will be a total of eight caverns here. At Lowell, Mich., two caverns are being washed to 100,000 bbl. each.

Continental Oil Co.: A 15-M.M.s.c.f.d. gasoline plant has been under construction (Fish Engineering Corp. is contractor) in Sussex field, Johnson County, Wyoming, at estimated cost of $700,000. Probable completion date January 1956. Gas comes from Sussex, Meadow Creek, and West Sussex pools.

El Paso Natural Gas Co.: A gasoline-absorption-plant addition is planned for Blanco, N. M., and a fractionating-plant addition for Wingate, N. M. At Blanco there will be absorption facilities only; product will be piped to Wingate for fractionation. This is part of 450-M.M.s.c.f.d. San Juan-Topock project. It involves gas-processing addition of 283 M.M.s.c.f.d. for absorption and 258,000 gal. daily addition for fractionation with estimated cost at

$3,282,800 and $3,483,000 respectively. Probable completion date November 1957. Stearns-Roger would be designer and El Paso Natural would be constructor.

Equitable Gas Co. is planning a 50-M.M.c.f.d. plant at Maytown, Ky., to be carried as Kentucky Hydrocarbon Gas Co., a subsidiary of Kentucky & West Virginia Gas Co.

Gulf Natural Gas Corp. is building a 27-M.M.c.f.d. plant near Shreveport, La. Gas from Pine Island field. Plant will serve many wells.

Honolulu Oil Corp.: Plant handling 6 M.M.s.c.f.d. completed and running at Trent, Tex. Gas is from White Flats field in West Texas. Plant is located 15 miles from White Flats pool. Honolulu Oil Corp. is operator.

Humble Oil & Refining Co. has completed two projects. One is the Julian gas-cycling plant at Encino, Tex., with capacity of 6 M.M.s.c.f.d., constructed by Gasoline Plant Construction Corp. at cost of $380,000, including gathering system. The other is the Neches gas plant at Jacksonville, Tex. (Cherokee County), handling 9.5 M.M.s.c.f.d. from Neches-Woodbine field. This was built by Fish Engineering Corp. Cost was around $2,582,000, including gathering and injection systems.

Jefferson Lake Sulphur Co. is building a 40-M.M.s.c.f.d. plant to handle gas from Bayou Sale field, St. Mary Parish, Louisiana. Sour-gas concentrate to be further processed for sulfur recovery.

Magnolia Petroleum Co. is planning a 40-M.M.s.c.f.d. gasoline plant 8 miles north of Attica, Kans. Probable completion May 1956. Firm is also reported planning to double liquids extraction and repressuring of Chitwood plant in Oklahoma.

Odessa Natural Gasoline Co.: Extension of plant at Odessa, Tex., from 27 to 40 M.M.c.f.d. was completed September 1, 1955, at cost of $2,000,000. Liquids extraction up from 50,000 to 110,000 gal. daily.

Parade Co. is planning plant near Overton, Rusk County, Texas, to make 125,000 gal. daily of L.P.G. and natural gasoline.

Pennsylvania Gas Co. has completed gasoline-absorption facilities, daily capacity of 4,500 gal., at Sheffield, Pa.

Phillips Petroleum Co. is completing a plant near Lindsay, Okla., including gathering system, compressor station, dehydration, and gasoline plant. Magnolia has interest. Phillips is also building a 75-M.M.s.c.f.d. plant in Andrews County, Texas, to cost $7,000,000.

Plomo Co. has a planned project to deliver 1.5 M.M.c.f.d. ethane from Robbstown, Tex., facilities.

Pure Oil Co. has completed installation of 1,100-hp. compressor and additional process equipment to increase from 16 to 20 M.M.c.f.d. capacity of Adena gasoline plant at Fort Morgan, Colo. Stearns-Roger was contractor.

Richfield Oil Corp. is completing two projects in California. Daily capacity of 70 M.M.s.c.f.d. is involved in installation of 1,300-psi. absorption facilities for North Coles Levee field. Gas processing plant, compressor, and pipelines (capacity of 5 M.M.s.c.f.d.) were installed in East Los Angeles field. The North Coles Levee facilities were designed by C. F. Braun & Co. and the East Los Angeles by J. B. Gill Co., with construction on both projects by Richfield.

Sinclair Oil & Gas Co. is building a gas products plant with field gathering system to use oil-well gas production in Hulldale field of Schleicher County, West Texas. The plant will have initial compressor capacity of 12 M.M.s.c.f.d. but with processing equipment designed for 20,000,000 cu. ft. daily. Compressor capacity will be added in the future to take care of all oil-well gas production in the Hulldale as necessary. It is estimated that some 48,000 gal. of products daily will be recovered. Probable completion date April 1956. Delta Engineering Co. is contractor. Hulldale operators committee has been studying feasibility of injecting gas into the Strawn reservoir.

Sohio Petroleum Co. is planning enlargement of Elmore City, Okla., gasoline plant to 30 M.M.c.f.d. at estimated cost of $1,000,000. Probable completion date November 1956.

Sohio Petroleum Co. and Gulf Oil Corp. are planning cycling plant at Opelousas, La., with capacity of 50 M.M.s.c.f.d. at estimated cost of $2,300,000. Probable completion date December 1956.

Stanolind Oil & Gas Co. has two projects under way. One is at Andrews, Tex., (Fullerton) involving daily capacity of 7 M.M.s.c.f.d. with probable completion in April 1956. The other is at Lubbock, Tex. (Anton-Irish field) with initial capacity of 4 M.M.c.f.d. and ultimate of 12,000,000 cu. ft. daily. Probable completion of the Anton-Irish project is May 1956.

Sun Oil Co. is working on extension (65 M.M.s.c.f.d.) of Jameson plant in Coke County, Texas, involving both compression and processing facilities. Estimated cost is $950,000. Probable completion April 1956.

Sunray Mid-Continent Oil Co. has completed cycling at Church Point, La. This is cycling-pressure maintenance in Northwest Branch field, Acadia Parish. Capacity: 27 M.M.c.f.d. Tuloma Builders was the contractor. A large products-recovery plant is now under construction (probable completion in May 1956) at Ingleside, Tex. Capacity is 140 M.M.c.f.d. of gas from Redfish Bay-Mustang Island field, San Patricio County. Dresser Engineering is contractor. A third project is under way for Sunray Mid-Continent. This is extension of the Moore, Okla., plant to increase recovery from additional 11 M.M.c.f.d. being constructed by Tuloma Builders with probable completion in May 1956.

The Texas Co. has an increase of 16,000 gal. daily in liquids recovery under way for the Davenport, Okla., plant with installation of high-pressure absorption and additional fractionation facilities. Probable completion February 1956.

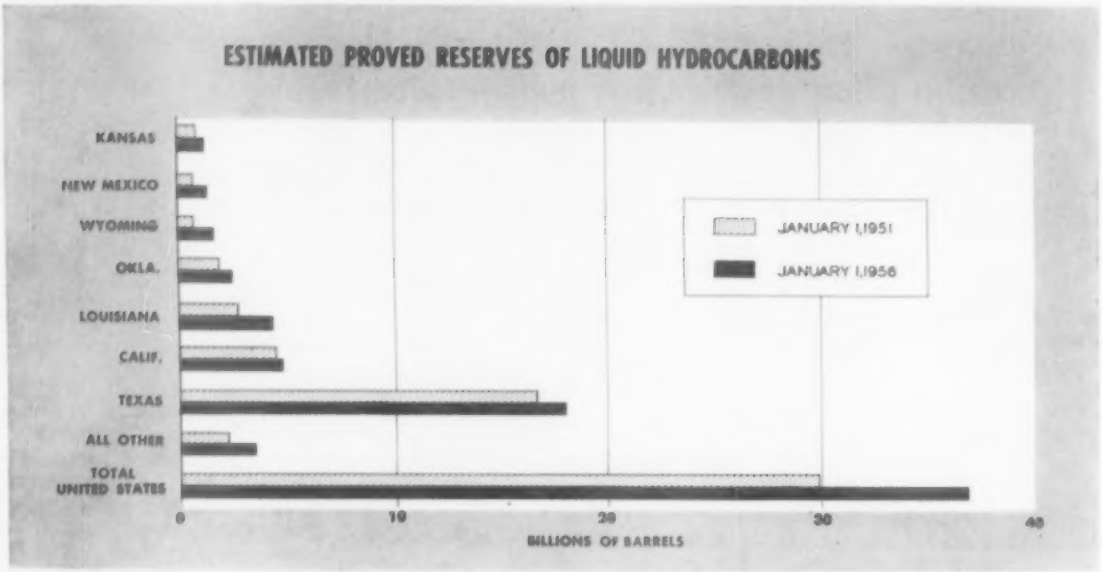
Texas Gulf Producing Co. is expanding plant for Headlee field, Ector and Midland counties, Texas, to 30 M.M.c.f.d. Fish Engineering is contractor.

Texas Natural Gasoline Corp. is completing Silver, Tex., gasoline plant with capacity of 70 M.M.c.f.d. (Jameson Strawn sand and Fuller-Coke-Strawn) in northwest Coke County. Fluor Corp. is contractor.

Tide Water Associated Oil Co.: Southern Division of Tide Water is building gasoline plant at Venice, La., with capacity of 35 M.M.c.f.d. at estimated cost of $1,000,000 with probable completion in March 1956. Delta Engineering Co. is contractor.

Valley Gas Corp. has completed expansion of gasoline plant (total of 4 M.M.c.f.d. involved) at estimated cost of $150,000.

Warren Petroleum Corp. is planning to remodel McLean, Tex., plant at estimated cost of $300,000 for completion in May 1956.



After a mediocre year for oil finding . . .

Reserves Gain Less Than Billion Barrels

by Frank J. Gardner

IT was a poor year in the United States as far as discovery of new reserves was concerned. Oil and gas discoveries in 1955 added an estimated 756 million barrels of crude oil and 144 million barrels of natural-gas liquids to domestic reserves. Approximately 3,608 million barrels of liquids was discovered, and 2,708 million was produced, leaving a net gain of 900 million barrels over-all.

As of January 1, 1956, the proved United States reserves of total hydrocarbon liquids (crude oil plus natural-gas liquids) are estimated to be 36,880 million barrels; of this, 31,491 million is crude oil, and 5,389 million is natural-gas liquids.

Revision and extension of reserves in older fields accounted for most of the newly discovered supplies of liquids, 2,820 million barrels falling into this category, while only 788 million resulted from newly discovered fields. The record production rate that marked 1955 (2,708 million barrels of liquids) certainly accounts in part for the decrease in net gain during the year.

Success ratio stays . . . The drilling of 56,682 wells in 1955 set another new record. Of these, 12,271 were wildcats, and 2,165 of these were discoveries. This compares with 11,280 wildcats during 1954, of which 1,997 were successful. So the success ratio stayed about the same at 17.65 per cent over the 2-year period.

There was only one bright spot in the nation as far as new reserves went. That was the South Louisiana area, on shore and off. Operators there are beginning to hit some big ones, and to make big ones out of little ones. Some of this success has already affected the reserves table, but the real impact of offshore operations will be felt in the "revisions and extensions" column of future reserve tabulations of the next 5 years. Some offshore operators already claim major status for anywhere from 6 to 10 submerged fields, but the proved status of most of these for the "giants"* column has yet to come.

New techniques help . . . Another factor that has begun to be reflected in the reserves table is the effect of

*These giant fields are marked with an asterisk in the tables of production and estimated remaining reserves for the larger fields of the United States. These tables appear starting at the end of this article.

ESTIMATED PROVED RESERVES OF TOTAL LIQUID HYDROCARBONS IN THE UNITED STATES
(Millions of barrels)

	Jan. 1, 1956	Jan. 1, 1955*	Change
Arkansas	415.5	421	— 5.5
California	4,589.5	4,635	—45.5
Colorado	428.3	420	8.3
Illinois	762.7	712	50.7
Kansas	1,168.0	1,119	49.0
Kentucky	126.0	124	2.0
Louisiana	4,292.0	3,920	372.0
Michigan	61.0	66	— 5.0
Mississippi	481.5	424	57.5
Montana	371.2	244	127.2
New Mexico	1,277.0	1,229	48.0
North Dakota	254.0	234	20.0
Oklahoma	2,398.0	2,273	125.0
Pennsylvania	143.0	145	— 2.0
Texas	18,145.0	18,049	96.0
West Virginia	69.5	70	— 0.5
Wyoming	1,602.0	1,635	—33.0
Others	295.5	259	36.1
Total United States	**36,879.7**	**35,979**	**900.3**

*Adjusted 1955, The Oil and Gas Journal figures.

Estimated Proved Recoverable Reserves of Crude Oil in U. S.

(Thousands of barrels)

	Proved reserves, 1-1-55	1955 discoveries	1955 extensions and revisions	1955 production	Proved reserves As of 1-1-56	Proved reserves Year's change	Proved reserves Per cent of U. S.
Alabama	16,000	1,000	411	1,411	16,000	0	0.05
Arkansas	374,000	5,000	19,349	28,349	370,000	— 4,000	1.18
California total	4,305,000	37,000	271,198	355,198	4,258,000	—47,000	13.50
Coastal	932,000	5,000	61,920	84,920	914,000	—18,000	2.90
Los Angeles	1,258,000	11,000	95,933	119,933	1,245,000	—13,000	3.96
San Joaquin	2,115,000	21,000	113,345	150,345	2,099,000	—16,000	6.64
Colorado	407,000	14,000	45,751	52,751	414,000	7,000	1.32
Illinois	690,000	8,000	119,878	80,878	737,000	47,000	2.34
Indiana	61,000	2,500	4,258	10,758	57,000	— 4,000	0.18
Kansas	944,000	25,000	150,643	121,643	998,000	54,000	3.17
Kentucky	113,000	8,000	10,472	15,472	116,000	3,000	0.37
Louisiana total	3,036,000	210,500	373,536	253,036	3,367,000	331,000	10.69
North	558,000	30,500	180,156	50,656	718,000	160,000	2.26
South	2,478,000	180,000	193,380	202,380	2,649,000	171,000	8.43
Michigan	65,000	1,000	5,338	11,338	60,000	— 5,000	0.19
Mississippi	364,000	10,000	86,486	36,486	424,000	60,000	1.35
Montana	237,000	4,000	138,075	15,075	364,000	127,000	1.16
Nebraska	34,000	20,000	30,973	10,973	74,000	40,000	0.24
New Mexico	889,000	26,000	80,571	80,571	915,000	26,000	2.92
New York	70,000	0	0	3,000	67,000	— 3,000	0.21
North Dakota	234,000	4,000	27,127	11,127	254,000	20,000	0.81
Ohio	32,000	335	9,000	4,335	37,000	5,000	0.12
Oklahoma	1,939,000	35,000	280,739	201,739	2,053,000	114,000	6.50
Pennsylvania	142,000	0	6,550	8,550	140,000	— 2,000	0.45
Texas total	15,121,000	305,000	740,388	1,021,388	15,145,000	24,000	48.09
East	2,796,000	28,000	107,649	141,649	2,790,000	— 6,000	8.86
Gulf Coast	3,370,000	30,000	85,775	207,775	3,278,000	—92,000	10.41
North	1,185,000	20,000	55,168	126,168	1,134,000	—51,000	3.60
Panhandle	418,000	15,000	30,975	33,975	430,000	12,000	1.37
Southwest	1,326,000	22,000	110,125	106,125	1,352,000	26,000	4.29
West	6,026,000	190,000	350,696	405,696	6,161,000	135,000	19.56
Utah	37,000	100	127	2,227	35,000	— 2,000	0.11
West Virginia	36,000	0	1,310	2,310	35,000	— 1,000	0.11
Wyoming	1,584,000	10,000	55,016	99,016	1,550,000	—34,000	4.92
Others*	5,000	100	598	698	5,000	0	0.02
Total United States	**30,735,000**	**726,535**	**2,457,794**	**2,428,329**	**31,491,000**	**756,000**	**100.00**

*Arizona, Florida, Missouri, Nevada, South Dakota, Tennessee, Virginia.

Giant Fields vs. All Fields

Crude, Condensate, and Cycled Products

(Millions of barrels)

State—	Number giants	1955 Production All fields	1955 Production Giant fields	1955 Production Giants' per cent	Estimated ultimate All fields	Estimated ultimate Giant fields	Estimated ultimate Giants' per cent	Remaining reserves All fields	Remaining reserves Giant fields	Remaining reserves Giants' per cent
Texas	67	1,164.36	497.12	42.7	34,330	21,323	62.1	15,524	9,297	59.9
California	40	357.04	273.49	76.6	14,764	12,402	84.0	4,354	3,323	76.3
Oklahoma	20	201.74	93.60	46.4	9,335	5,043	54.0	2,132	1,091	51.2
Louisiana	20	278.06	90.93	32.7	7,889	2,939	37.3	4,082	1,349	33.0
Kansas	6	121.64	25.23	20.7	3,709	1,073	28.9	988	285	28.8
Illinois	6	80.88	35.97	44.5	2,571	1,455	56.6	737	333	45.2
Wyoming	5	99.36	23.99	24.1	2,878	1,060	36.8	1,550	372	24.0
New Mexico	4	81.68	28.78	35.2	2,009	808	40.2	987	280	28.4
Arkansas	3	28.50	9.90	34.7	1,333	712	53.4	390	106	27.2
Montana	3	15.07	5.77	38.3	591	358	60.6	364	270	74.2
Mississippi	3	38.70	9.91	25.6	918	411	44.8	454	187	41.2
N. Y.-Pa.	2	11.47	9.42	82.1	1,578	928	58.8	207	200	96.6
Colorado	1	52.75	23.68	44.9	760	366	48.2	425	177	41.6
North Dakota	1	11.13	4.80	43.1	307	155	50.5	283	144	50.9
Other states	0	59.51	0	0	2,560	0	0	441	0	0
Total United States	**181**	**2,601.89**	**1,132.59**	**43.5**	**85,532**	**49,033**	**57.3**	**32,918**	**17,414**	**52.9**

*Fields with estimated ultimate recovery of 100 million barrels or more.

Estimated Proved Recoverable Reserves of Natural-Gas Liquids in U. S.

Includes Condensate, Natural Gasoline, and Liquefied Petroleum Gases
(Thousands of barrels)

	Proved reserves, 1-1-55*	1955 discoveries	1955 extensions and revisions	1955 production	Proved reserves As of 1-1-56	Proved reserves Year's change	Per cent of U. S.
Arkansas	46,919	480	1,001	2,900	45,500	— 1,419	0.84
California	330,249	5,010	27,441	31,200	331,500	1,251	6.15
Colorado	12,747	850	1,453	700	14,350	1,603	0.27
Illinois	22,220	1,500	5,680	3,700	25,700	3,480	0.50
Indiana	151	7	40	35	163	12	
Kansas	175,197	310	303	5,810	170,000	— 5,197	3.16
Kentucky	10,740	460	1,300	2,500	10,000	— 740	0.20
Louisiana	884,046	12,054	65,700	36,800	925,000	40,954	17.14
Michigan	913	40	122	80	995	82	0.02
Mississippi	60,420	405	—2,410	915	57,500	— 2,920	1.10
Montana	7,179	65	266	310	7,200	21	0.13
Nebraska	2,268	62	300	130	2,500	232	0.05
New Mexico	339,991	8,500	27,009	13,500	362,000	22,009	6.72
Ohio	1,439	11	20	20	1,450	11	0.03
Oklahoma	333,911	10,389	31,000	30,300	345,000	11,089	6.40
Pennsylvania	2,869	51	215	135	3,000	131	0.06
Texas	2,928,137	20,063	195,000	143,200	3,000,000	71,863	55.62
Utah	47	2	1	5	45	— 2	
West Virginia	33,994	600	5,006	5,100	34,500	506	0.64
Wyoming	50,686	1,014	2,400	2,100	52,000	1,314	0.97
Others	334	31	130	145	350	16	
Total United States	**5,244,457**	**61,904**	**361,977**	**279,585**	**5,388,753**	**144,296**	**100.00**

*Data from American Gas Association figures as of 1-1-55.

fracturing techniques. This was especially noticeable in North Louisiana, southern Arkansas, and along the Texas fault zones.

But stimuli are needed . . . The story of 1955 is not too encouraging. If we are to continue to find enough new oil to meet the forecast demands of the next 20 years, we are going to have to increase our success rates. How? That's the stickler in exploration circles today, but there are several stimuli that have been suggested as possible solutions; among them: a cheaper geophysical approach, ever faster and cheaper drilling, a boost in the price of crude, better geological training in the schools, a return to basic thinking by the older geologist, and last but by no means least, a break with the routine thinking that occupies most exploration people today.

Production and Proved Remaining Reserves—By Fields

On these pages are the estimated proved remaining reserves of crude oil, condensate, and cycled products for the larger fields in the United States. Those major fields with an estimated ultimate recovery of 100 million barrels or more are flagged by asterisks. Fields included all produce 1,000 bbl. or more per day (in Texas, 3,000 bbl.); number of wells includes those producing oil or lease condensate. Figures in thousands of barrels.

ARKANSAS

	1955 production	January 1, 1956 Cumulative	Estimated reserves	No. of wells
Atlanta	466	16,145	3,855	40
Buckner	472	12,104	10,896	46
Cairo	475	4,190	13,810	20
Dorcheat-Macedonia	609	17,922	7,078	64
El Dorado, East	1,383	15,095	9,905	281
Falcon	572	1,209	4,791	79
Fouke	1,224	13,103	6,897	106
Horsehead	873	1,781	4,219	33
Kiblah	566	644	5,356	31
*Magnolia	2,913	82,781	29,219	109
McKamie	1,354	17,530	46,460	35
Midway	1,919	34,029	40,971	47
*Schuler	2,314	75,964	24,036	92
*Smackover	4,671	447,265	52,735	1,587
Stephens	1,031	26,912	15,088	464
Urbana	694	13,550	6,450	309
Village	837	16,829	7,171	87
Wesson	1,848	26,935	23,065	154

APPALACHIAN

	1955 production	January 1, 1956 Cumulative	Estimated reserves	No. of wells
*Alleghany	2,263	149,316	44,684	
*Bradford	7,154	579,385	154,615	

CALIFORNIA

COASTAL REGION

Aliso Canyon	2,844	24,397	30,603	115
Bardsdale	369	6,649	5,351	93
Casmalia	616	18,351	6,649	52
Castaic Hills	888	4,895	9,305	56
Castaic Junction	1,845	4,449	15,551	46
*Cat Canyon, West	5,337	77,149	57,851	280
Del Valle	939	18,970	11,030	81
*Elwood	1,288	96,038	13,962	43
Fillmore	435	565	2,435	5
Gato Ridge	951	22,606	12,394	43
Guadalupe	855	3,123	16,877	46
Honor Rancho	856	4,840	7,160	18

CALIFORNIA (Continued)

	1955 production	January 1, 1956 Cumulative	Estimated reserves	No. of wells
Lompoc	1,253	26,990	13,010	107
Montalvo, West	762	2,412	7,588	27
Newhall-Potrero	3,612	39,081	35,919	113
Oak Canyon	390	7,183	4,817	21
Oakridge	840	3,256	11,744	41
*Oreutt	1,219	117,315	17,685	270
Oxnard	1,011	6,761	13,239	38
Placerita	1,826	25,132	19,868	328
Ramona	719	13,292	11,708	123
Rincon	3,199	55,699	34,301	240
*San Ardo	10,931	45,202	104,798	520
San Miguelito	1,839	38,447	31,553	131
*Santa Maria Valley	3,017	121,016	38,984	415
*South Mountain	4,695	54,549	45,451	367
Tapo Canyon, South	664	2,332	3,668	22
Torrey Canyon	1,227	9,688	20,312	65
*Ventura	26,948	536,655	263,345	1,035
Zaca Creek	1,319	10,049	17,951	39
LOS ANGELES BASIN				
Bandini	472	662	4,338	24
*Brea-Olinda	7,485	244,176	85,824	577
*Coyote, East	2,118	72,307	27,693	266
*Coyote, West	2,368	183,862	46,138	330
*Dominguez	3,446	206,630	48,370	339
*Huntington Beach	24,253	568,231	231,769	1,755
*Inglewood	4,382	198,884	51,116	480
*Long Beach	9,992	791,453	93,547	1,225
*Montebello	1,555	164,339	15,661	329
Newport, West	1,679	20,711	24,289	230
Playa del Rey	452	57,742	4,258	90
*Richfield	2,509	127,042	22,958	418
Rosecrans	1,297	74,343	15,657	226
Sansinena	3,832	13,815	36,185	132
*Santa Fe Springs	4,588	558,840	51,160	592
*Seal Beach	3,618	141,730	38,270	245
Sunset Beach	1,766	1,818	13,182	65
*Torrance	2,565	143,451	26,549	810
Whittier	562	23,211	6,789	130
*Wilmington	38,886	730,568	369,432	2,700
Yorba Linda	423	4,194	5,806	59
SAN JOAQUIN VALLEY				
Antelope Hills	382	6,548	5,452	37
Belgian Anticline	1,905	12,120	17,880	81
Belgian Anticline, Northwest	1,757	2,539	12,461	40
Belridge, North	536	62,937	7,063	73
*Belridge, South	3,597	63,212	36,788	1,007
*Buena Vista	7,711	448,088	101,912	1,014
Canal	363	17,533	4,467	29
*Coalinga, East	4,772	302,270	57,730	891
*Coalinga Nose	16,416	250,007	199,993	114
*Coalinga, West	2,425	178,087	21,913	832
*Coles Levee, North[1]	5,628	84,183	65,817	146
Coles Levee, South	961	15,669	14,331	42
*Cuyama, South	12,674	76,059	148,941	221
*Cymric	3,893	59,721	40,279	427
*Edison	4,976	67,706	57,294	695
*Elk Hills[2]	6,791	230,535	469,465	313
*Fruitvale	3,400	65,520	39,480	360
Gosford, East	428	4,267	4,733	24
*Greeley	4,356	69,220	40,780	74
Guijarral Hills	4,790	24,929	50,071	98
Helm	992	15,809	9,191	70
Jacalitos	519	16,536	8,464	106
Kern Bluff	393	4,033	3,967	126
*Kern Front	2,177	86,289	23,711	679
*Kern River	3,257	329,289	40,711	2,858
*Kettleman North Dome	5,451	407,642	72,358	285
Los Lobos	439	982	4,018	20
*Lost Hills	1,853	77,300	22,700	654
McDonald Anticline	437	2,200	4,800	42
*McKittrick	945	101,346	10,654	247
*Midway-Sunset	14,752	813,092	146,908	3,424
*Mount Poso	2,663	113,430	26,570	397
Mountain View	1,549	59,602	20,398	222
Paloma[1]	1,099	34,493	15,507	62
Pleasant Valley	377	11,783	4,217	19
Premier	1,238	20,616	14,384	267
Pyramid Hills	614	2,839	5,161	160
Raisin City	1,933	18,110	16,890	108
*Rio Bravo	4,556	76,998	48,002	97
Riverdale	504	13,057	6,943	41
Rosedale	396	1,654	4,346	19
Rosedale Ranch	721	1,603	8,397	36
Round Mountain	1,106	44,997	15,003	183
Russell Ranch	3,493	40,708	49,292	155
Strand, West	325	5,995	4,005	16
Tejon-Grapevine	2,903	11,312	23,688	189
Tejon Hills	1,009	7,463	10,537	221
Ten Section	1,648	56,594	18,406	109
Wheeler Ridge	2,380	11,048	28,952	111

(1) Figures do not include condensate at Coles Levee, North, and Paloma. (2) Does not include 625 shut-in producers at Elk Hills.

MICHIGAN

	1955 production	January 1, 1956 Cumulative	Estimated reserves	No. of wells
Coldwater	1,058	16,232	8,768	67
Deep River	1,188	23,263	14,737	81
Eden	589	1,469	6,531	30
Kawkawlin	466	9,011	5,989	306
Norwich, East	416	4,647	2,353	98
Reed City	474	40,242	5,758	166
Rose City	469	2,686	3,314	103
Stony Lake	425	6,392	2,608	69

SOUTHEASTERN STATES

ALABAMA

Gilbertown and East	491	5,948	4,052	64
Pollard	806	2,935	7,065	36

MISSISSIPPI

Baxterville	5,267	50,147	44,853	180
Bolton	648	690	4,310	17
Brookhaven	3,298	39,962	35,038	139
Church Hill	740	2,586	7,414	31
*Cranfield	3,141	42,766	57,234	116
Eucutta	1,319	21,647	18,353	127
*Heidelberg	3,273	41,475	69,525	201
Idlewild	434	813	4,187	18
Kingston and North	808	3,929	6,071	28
La Grange and South	2,145	26,927	23,073	170
Mallalieu	1,111	25,692	14,308	71
Maxie-Pistol Ridge	690	1,985	8,015	67
Overton	591	1,348	6,652	20
Pickens	528	16,781	8,219	37
Sibley	537	2,469	7,531	24
Soso	3,131	5,171	29,829	107
Sunnyside	518	1,255	3,745	14
*Tinsley	4,499	141,096	58,904	307
Yellow Creek and West and North	1,413	11,172	14,828	132

FLORIDA

Sunniland and Forty-Mile Bend	498	4,339	3,661	12

TRISTATE AREA

INDIANA

Griffin	2,432	37,941	10,059	575
Mount Carmel	426	4,960	2,030	161
Mount Vernon	548	7,338	2,662	157
Rochester	430	5,466	2,534	42
Union-Bowman	656	4,734	5,266	413
Welborn	445	3,069	2,931	112

KENTUCKY

Apex	589	643	5,357	178
Hitesville	561	8,449	3,551	193
Poole	552	13,360	6,630	492
Smith Mills, North[1]	986	1,931	11,069	57
Uniontown	673	15,142	2,858	251

(1) Includes Indiana portion of pool.

ILLINOIS

Aden	540	7,587	5,413	88
Albion	1,232	15,262	9,738	382
Allendale	545	8,371	2,629	361
Assumption	544	5,124	2,876	145
Barnhill	388	3,707	3,293	63
Benton	1,462	32,139	7,861	237
Boulder	411	5,621	1,379	40
Boyd	718	10,565	4,495	110
*Bridgeport	3,417	257,190	27,810	3,579
Bungay	704	8,534	2,466	183
Cantrell	970	3,048	4,952	126
Centralia	563	39,039	4,961	558
*Clay City	10,300	178,596	46,404	3,309
Dale	1,912	51,229	13,771	632
Edinburg, West	611	628	3,372	23
El Dorado	3,665	4,113	30,887	157
Ellery	595	2,438	4,562	144
Golden Gate	451	6,873	3,127	171
Herald	636	5,759	3,241	259
Inman, East	1,967	11,954	6,046	334
Inman, West	371	3,389	2,611	201
Iola	451	8,731	11,269	196
Iron	744	13,463	3,597	241
Johnsonville	839	29,458	5,542	366
King	366	2,111	3,889	46
*Loudon	7,535	187,997	112,003	2,080
Mattoon	459	11,604	2,396	411
Maunie, North	620	1,819	6,181	91
Maunie, South	633	5,254	4,746	118
Mills Shoals	476	7,432	7,568	181
Mount Carmel	433	10,203	9,797	370
*New Harmony	4,440	83,970	21,930	1,787

ILLINOIS (Continued)

	1955 production	January 1, 1956 Cumulative	Estimated reserves	No. of wells
New Memphis	500	727	4,273	24
Phillipstown	979	15,172	6,828	364
*Robinson	2,606	168,756	21,244	6,688
Roland	2,045	14,963	15,037	371
St. James	374	13,378	2,622	163
Sailor Springs	1,544	24,564	10,436	688
*Salem[1]	7,673	245,903	104,097	2,372
Woburn	765	1,855	5,145	73
Woodlawn	367	13,925	2,075	148

(1) Includes Dix pool, consolidated in 1955.

LOUISIANA

NORTH LOUISIANA

Bee Brake	478	586	3,414	23
Bellevue	553	15,089	6,911	357
Benton	1,107	10,241	7,759	13
*Caddo	9,136	222,749	177,251	5,137
Catahoula Lake	375	3,455	4,545	19
Catahoula Lake, West	594	3,832	6,168	42
Colquitt	619	705	2,295	15
Cottage Grove	486	539	5,461	40
*Cotton Valley	5,109	84,203	30,797	273
*Delhi-Big Creek	6,165	80,470	144,530	340
DeSoto	408	64,308	11,692	211
Esperance Point	1,021	3,162	8,838	31
*Haynesville (incl. Ark.)	2,184	125,874	29,126	387
Haynesville, East	1,272	11,234	13,766	135
Homer	727	83,671	11,329	304
Knowles	1,315	8,446	7,554	41
*Lake St. John	3,632	62,600	49,400	143
Lisbon	1,204	29,478	32,522	300
Nebo	2,118	37,642	22,358	168
Olla	1,384	38,497	16,503	161
*Rodessa (incl. Ark. & Tex.)	1,661	106,994	78,006	489
Ruston	556	3,081	4,919	19
Saline Lake	410	3,644	2,356	21
Sligo	1,039	11,361	3,639	80
Springhill (incl. Ark.)	520	2,948	5,052	70
Urania	741	36,674	5,326	252
Waskom-Greenwood	495	2,945	7,055	137

SOUTH LOUISIANA

Anse La Butte	1,717	34,528	20,472	94
Avery Island	3,520	27,183	47,817	91
Avondale	429	3,325	6,675	16
Bancroft	784	11,321	17,679	27
Barataria	727	20,703	12,297	24
Barataria, West	602	10,385	10,615	21
Bateman Lake	2,017	12,745	31,255	44
Bay de Chene	1,462	8,381	19,619	42
Bay Marchand	2,850	13,670	19,330	59
Bay St Elaine	3,322	23,344	34,656	81
Bayou Blue	980	13,090	7,910	75
Bayou Choctaw	1,292	9,501	8,499	50
Bayou Couba	835	5,512	7,488	37
Bayou de Fleur	272	3,914	4,086	7
Bayou des Allemands	966	8,029	6,971	31
Bayou Mallet	1,173	10,694	14,306	69
Bayou Sale	3,118	53,700	42,300	78
Black Bayou	814	20,840	17,160	37
Bosco	603	34,410	11,590	40
Bully Camp	1,774	8,765	20,235	59
*Caillou Island	8,998	95,650	91,350	206
Cankton, North	958	8,251	13,749	56
Chacahoula	681	11,902	7,098	32
Charenton	1,222	26,156	15,844	141
Clear Creek	812	968	15,032	36
Clovelly	1,055	2,457	17,543	23
Cox Bay	3,105	12,450	16,550	69
Crowley, North	1,334	27,028	17,972	63
David Haas	568	7,259	7,741	20
Delacroix Island	695	6,883	5,117	21
Delta Duck Club	824	7,874	10,126	27
*Delta Farms	4,161	67,755	40,245	108
Delta Farms, West	699	2,191	15,809	17
DeQuincy	438	3,630	6,370	20
Dog Lake	1,089	13,885	11,115	39
Duck Lake	3,901	14,011	17,989	79
Egan	2,228	21,230	14,770	65
*Erath	3,451	63,661	61,339	29
Eugene Island	3,324	8,146	30,854	58
Fausse Point	1,345	6,494	23,506	47
Fordoche	848	5,682	8,318	35
Garden Island Bay	1,349	24,273	14,727	71
Gibson and East	1,049	32,522	9,478	52
*Golden Meadow	3,768	61,518	40,482	254
Good Hope	1,209	20,849	17,151	35
Grand Bay	3,380	49,756	34,244	100
Grand Lake	642	13,378	3,622	28
Gueydan and West	1,168	27,793	13,207	55
Hackberry, East	1,016	46,228	17,772	70
Hackberry, West	3,430	45,239	36,761	113
Horseshoe Bayou	875	13,471	18,529	25
Hurricane Creek	525	4,189	4,811	29

SOUTH LOUISIANA (Continued)

	1955 production	January 1, 1956 Cumulative	Estimated reserves	No. of wells
*Iowa	2,451	81,463	45,537	111
Jeanerette, South	851	6,192	7,808	26
*Jennings	900	106,264	18,736	103
Kinder	582	747	22,253	31
*Lafitte	3,354	95,744	32,256	91
Lake Chicot	1,018	13,262	9,738	28
Lake Mongoulois	866	7,169	10,831	23
Lake Palourde, East	544	678	8,322	11
Lake Pelto	2,224	24,001	17,999	63
Lake Verret, West	1,333	19,777	20,233	58
Lake Salvador	1,388	22,822	29,178	35
*Lake Washington	4,698	12,972	87,028	138
La Pice	876	10,507	15,493	31
La Rose	635	642	14,358	21
*Leeville	4,135	53,032	46,968	152
Little Lake	2,155	4,862	39,138	47
Main Pass Block 35	3,329	9,493	24,507	74
Main Pass Block 69	2,898	12,081	22,919	44
New Iberia	830	47,920	6,080	56
Paradis	3,150	51,253	28,747	79
Phoenix Lake	1,528	7,362	13,638	47
Pine Prairie	891	18,522	7,478	69
Pointe-a-la-Hache	2,182	14,318	19,682	63
Port Barre	919	27,531	10,469	63
*Quarantine Bay	3,156	49,466	64,534	111
Romere Pass	3,894	19,581	31,419	85
St. Gabriel	1,071	23,964	16,036	53
Section 28 Dome	1,361	10,312	9,683	49
*South Pass, Block 24	8,481	16,160	108,840	167
Sulphur Mines	367	25,558	4,442	36
Sunshine	527	5,131	8,869	19
Tepetate	423	19,583	4,417	49
Tepetate, North	467	8,750	7,250	52
Tepetate, West	808	16,489	7,511	28
Timbalier Bay	3,947	11,298	52,702	122
University	1,068	38,797	17,203	58
Valentine	1,694	13,344	18,656	72
*Venice	4,912	61,478	52,522	114
Ville Platte	1,244	54,571	13,429	115
*Vinton	2,351	84,326	39,674	143
*Weeks Island	8,232	58,087	109,913	140
West Bay	2,414	28,131	38,869	80
West Cote Blanche Bay	2,034	22,644	24,356	58
White Castle	768	23,545	13,455	36
White Lake, East	1,403	16,692	27,308	48

KANSAS

Augusta	400	47,330	4,670	191
Barry	534	7,687	4,313	69
*Bemis-Shutts	3,263	81,714	29,286	583
Blankenship	511	7,793	4,207	111
Bloomer	1,456	46,002	18,998	289
Boggs	409	2,752	1,248	39
Boyd	703	7,131	4,869	130
Burnett	2,064	49,443	20,557	298
Burnett, Southwest	400	4,759	3,241	82
Burrton-Haury	732	49,656	7,344	329
Carroll	376	2,850	1,150	74
*Chase-Silica	4,897	185,412	64,583	1,344
Cooper	857	4,825	3,175	118
David	652	21,902	6,098	143
Demalorie-Sowder	778	13,693	6,307	134
Dieboldt	607	830	5,170	84
Dopita	419	1,867	5,133	77
*El Dorado	4,242	223,353	51,647	1,764
Fairport	903	26,787	9,213	214
Fort Zarah	614	3,455	3,545	107
Fox-Bush	656	19,790	5,210	107
Garfield	884	1,043	10,957	151
Gates	611	4,843	5,157	108
Geneseo-Edwards	2,941	55,867	30,133	448
Gibson	579	2,040	2,960	96
Gladys	1,024	1,026	9,974	181
Gorham	1,589	59,078	26,922	444
Graper	534	12,609	5,391	111
Grabs	458	624	4,376	87
*Hall-Gurney	4,064	69,309	37,691	1,259
Harper Ranch	405	516	4,484	29
Hilltop	736	866	7,134	101
Iuka-Carmi	1,464	16,629	9,371	244
Jelinek	582	3,837	1,163	84
*Kraft-Prusa	3,826	74,115	45,885	722
Larned	527	1,469	4,531	54
Lost Springs	528	10,368	4,632	216
Madison	664	9,403	2,597	106
Marcotte	1,712	11,224	13,776	267
Max	469	6,600	3,400	92
Morel	1,470	19,802	14,198	218
Mueller	560	6,748	6,252	110
Northampton	423	3,135	2,865	51
Norton	971	1,696	8,304	117
Novinger	387	1,480	3,520	33
Ogallah	552	2,419	4,581	73
Otis-Albert	570	10,522	5,478	173
Ray	1,312	18,549	11,451	155

KANSAS (Continued)

	1955 production	January 1, 1956 Cumulative	January 1, 1956 Estimated reserves	No. of wells
Rhodes	1,026	2,483	11,517	127
Richardson	404	13,143	3,857	70
Ritz-Canton[1]	1,261	45,642	11,358	308
Russell	904	15,278	5,722	190
Sallyards	391	13,083	3,917	156
Seeley-Wick	1,479	23,830	11,170	304
Smolan	559	3,362	1,638	116
Solomon	586	2,802	3,198	101
Spivey	620	864	5,136	79
Stoltenberg	1,043	38,285	11,715	330
Thrall-Agard	775	29,873	12,127	315
*Trapp	4,943	153,783	56,217	1,311
Walters	638	9,003	5,997	122
Welch-Bornholdt	1,254	26,500	12,500	363
Winfield	388	11,867	3,133	88
Eastern Kansas Stripper	5,923	224,625	50,375	7,908

(1) Includes Lively pool, consolidated in 1955.

OKLAHOMA

*Allen (Deep and Shallow)	1,733	80,164	19,836	767
*Avant	366	102,158	4,842	591
Bald Hill	750	53,423	7,577	669
Bebee	836	28,482	8,518	470
Blackwell	389	8,475	2,525	101
*Bowlegs	718	136,417	13,583	193
Bradley	2,170	2,640	17,360	134
*Burbank[1]	10,139	306,169	99,831	2,352
Cache Creek	707	13,033	4,967	287
Caddo	462	1,818	6,182	62
*Cement	4,186	80,196	44,804	1,109
Ceres, South	531	4,972	5,028	121
Chandler[2]	434	17,514	5,486	112
Chickasha	877	1,092	8,908	187
Chitwood	701	5,826	2,174	31
Clothier, Southwest	601	2,138	6,862	32
Conservation	628	3,605	4,395	236
Cromwell	430	65,895	6,105	196
Cumberland	1,841	49,423	25,577	140
*Cushing	2,823	400,290	54,710	1,858
Davenport	1,133	20,603	9,397	301
Dilworth	1,135	15,332	17,668	354
Dora	551	7,667	5,333	104
Doyle	2,683	16,393	15,607	264
*Earlsboro	370	134,295	5,705	107
*Edmond, West	1,733	104,487	25,513	774
*Elk City	6,277	38,258	81,742	306
Eola[3]	2,193	8,834	11,166	63
Fish	388	22,625	4,375	99
*Fitts	872	112,646	12,354	455
Flat Rock	626	43,881	6,119	536
Fox-Graham (see Sho-Vel-Tum)				
Francis, West	417	1,337	5,663	102
Garber	692	62,406	7,594	517
*Glennpool	1,983	252,027	37,973	1,723
*Golden Trend[4]	19,039	125,111	124,889	1,786
*Healdton	2,307	224,605	24,395	2,044
*Hewitt	3,411	145,202	39,798	1,422
Holdenville[5]	1,476	13,130	14,870	512
Hoover, North	1,662	10,262	15,738	391
Iron Post	708	11,192	8,808	367
Jones	679	4,506	2,494	121
Kellyville	366	4,522	3,478	261
Knox	1,143	30,914	18,086	398
Lauderdale	526	17,201	6,799	226
*Little River	699	128,113	6,887	164
Loco[6]	1,370	15,594	19,406	783
Lucien	797	41,403	8,597	176
Mannford	589	9,676	6,324	357
Mount Vernon	462	1,892	8,108	63
Mount Vernon, Southwest	614	703	9,297	91
Naval Reserve	1,022	26,582	9,018	366
*Oklahoma City	3,803	709,231	69,769	566
Olympic	2,662	29,130	5,870	318
Pauls Valley	490	21,764	6,236	75
Payson[7]	918	4,260	9,740	189
Peavine	789	4,708	5,292	68
Purdy, Southeast	1,030	1,560	9,440	43
Ringwood	551	8,061	16,939	232
*Seminole	921	160,394	14,606	301
*Sho-Vel-Tum[8]	30,216	413,428	386,572	6,406
Slick	441	38,729	4,271	207
Soldier Creek	449	8,537	3,463	308
Stroud	676	22,446	7,554	393
*St. Louis	1,672	182,042	18,958	459
Tatums (see Sho-Vel-Tum)				
*Tonkawa	237	125,968	4,032	84
Velma (see Sho-Vel-Tum)				
Velma, West	455	5,194	1,806	50
Walters	423	29,865	4,135	319
Washington, East	365	1,596	3,404	8
Wewoka[9]	611	51,384	6,616	262
Wildhorse	1,080	18,676	6,324	402
Witcher	439	11,037	7,963	173

OKLAHOMA (Continued)

	1955 production	January 1, 1956 Cumulative	January 1, 1956 Estimated reserves	No. of wells
Yale-Quay	1,479	37,109	13,891	307
Northeast Stripper Area	10,229	435,829	139,171	15,249

1. Includes Burbank, Burbank South, Little Chief Northeast and Little Chief West, consolidated in 1955.
2. Includes Hoyt pool, consolidated in 1955.
3. Includes Eola North and Eola Northwest, consolidated in 1955.
4. In addition to the Golden Trend pool, the following are included: Blue Hill; Bradley, East; Goldsby, Southwest; Iron Chapel; Lindsay, North; Lindsay, Northeast; Lindsay, West; Newcastle, East; Newcastle, Southeast.
5. Includes Holdenville East and Holdenville West, consolidated in 1955.
6. Includes Loco Southwest and Woolsey pools, consolidated in 1955.
7. Includes Payson East, consolidated in 1955.
8. Includes following pools consolidated in 1955: Alma, North; Alma, Northeast; Alma, Southwest; Ava; Ava, North; Ava, Northwest; Camp; Camp, Southeast; Fox-Graham; Milroy; Milroy, West; Sholem-Alechem; Sholem-Alechem, Northwest; Sholem-Alechem, Southwest; Sholem-Alechem, West; Tatums; Velma; Wheeler.
9. Includes Wewoka Lake and Wewoka Townsite, consolidated in 1955.

NEW MEXICO

Anderson Ranch	1,169	2,026	19,974	18
Arrowhead	638	21,078	8,922	112
Artesia	536	9,105	10,895	308
Bagley	1,659	10,759	22,241	37
Bough	415	3,431	6,569	10
Bronco	767	10,375	19,625	12
Brunson	1,691	22,841	27,159	128
Caprock and East	2,243	10,443	19,557	165
Caudill Devonian	748	775	9,225	10
Cooper-Jal and Jal Mat	1,434	33,307	56,693	303
Crossroads	1,193	6,157	8,843	23
*Denton	11,631	36,313	88,687	265
Dollarhide, West	3,164	9,274	30,726	162
Drinkard	2,482	40,764	34,236	468
Edison	478	1,317	4,683	10
*Eunice-Monument	10,544	268,083	93,917	1,083
Echols	681	2,144	7,856	10
Fowler	1,362	4,003	10,997	19
Gladiola	1,293	5,270	21,730	32
Grayburg-Jackson	1,654	32,941	16,059	389
Hare	1,290	9,805	19,195	82
*Hobbs	3,397	149,866	46,134	279
Langlie-Mattix	1,641	34,366	13,634	557
Lazy J Penn	740	1,779	13,221	32
Lovington and East	3,316	16,766	18,234	180
Loco Hills	423	15,984	9,016	208
Maljamar	1,878	30,755	21,245	283
Moore	1,228	3,473	16,527	20
Paddock	561	10,538	9,462	103
Saunders and South	1,903	8,619	19,381	55
Terry Blinebry	743	1,234	18,766	55
Townsend Wolfcamp	2,231	4,106	15,894	52
*Vacuum	3,894	73,977	51,023	444
Warren	1,568	5,860	14,140	34
Wilson and North and South	486	7,098	7,902	53

ROCKY MOUNTAIN STATES

COLORADO

Adena	5,867	10,439	39,560	194
Badger Creek	738	2,212	9,788	50
Big Beaver	899	945	4,055	22
Black Hollow	793	1,345	2,655	17
Bobcat	1,239	1,674	6,326	35
Cliff	1,012	1,012	5,988	29
Divide-Springdale	650	1,097	6,903	32
Graylin[1]	1,641	4,235	12,765	67
Lewis Creek	675	1,611	2,389	17
Little Beaver Creek	1,704	6,481	16,519	91
Little Beaver, East	498	498	5,502	26
Merino	367	2,034	2,966	19
Mount Hope	1,053	3,735	14,265	74
Plum Bush Creek	768	768	9,292	39
*Rangely	23,678	189,350	176,650	557
Sand River	610	735	5,265	24
Wilson Creek	2,416	32,059	17,941	38
Yenter	911	4,574	8,426	53

(1) Includes Graylin, Northwest, consolidated in 1955.

WESTERN NEBRASKA

Doran	389	976	6,024	28
Enders	586	1,960	6,030	35
Harrisburg	1,667	2,539	12,461	59
Lodgepole	366	435	4,565	19
Long	1,616	2,256	12,740	59
Malley	566	775	2,225	13
Potter, Southwest	562	2,051	10,949	53
Torgeson	404	794	5,206	25
Travis	388	388	6,612	28

ROCKY MOUNTAIN STATES (Continued)

UTAH

	1955 production	January 1, 1956 Cumulative	Estimated reserves	No. of wells
Ashley Valley	938	6,439	6,561	29
Red Wash	803	2,303	23,697	21

MONTANA

Bowes Dome	525	4,079	7,921	75
Cabin Creek	602	854	6,146	18
*Cut Bank	2,740	80,917	32,083	1,207
Elk Basin (see Wyoming)				
Glendive	621	2,073	12,927	14
Kevin-Sunburst	1,139	61,462	18,538	1,669
Pine Unit	949	1,635	11,365	33
Pondera	444	12,247	8,753	329
*Poplar, East	3,033	7,516	237,484	70
Sumatra	1,589	2,756	27,244	57

NORTH DAKOTA

*Beaver Lodge	4,799	11,232	143,768	218
Capa	384	532	17,468	23
Charlson	705	1,064	34,936	45
Tioga and East	4,198	8,972	48,028	211

WYOMING

Ash Creek and South[1]	1,004	1,887	13,113	49
Beaver Creek	1,078	3,893	36,107	38
Bid Muddy	1,258	37,900	17,100	277
Big Sand Draw	2,560	21,054	33,946	17
Bonanza	4,765	13,177	26,823	51
Byron	2,515	35,149	14,851	66
Circle Ridge	1,396	7,780	12,210	116
Clareton	3,877	19,554	35,446	706
Cole Creek and South	1,194	13,535	11,465	92
Crooks Gap	703	7,025	2,975	7
Dugout Creek	751	1,801	8,199	26
*Elk Basin[1]	8,888	99,136	200,864	284
Elk Basin, South	679	4,732	7,268	21
Frannie[1]	3,564	37,569	13,431	130
Garland	5,022	34,899	25,101	118
Gebo	1,421	6,623	5,377	42
Glenrock	3,649	16,625	33,375	209
Golden Eagle	1,118	3,391	6,609	9
Grass Creek	4,105	55,629	39,371	378
Hamilton Dome	4,758	38,715	31,285	137
Happy Springs	1,106	3,215	11,785	26
La Barge	375	14,015	1,985	162
*Lance Creek	1,113	94,767	25,233	221
Little Buffalo Basin	1,304	10,687	6,313	27
*Lost Soldier	3,995	62,917	37,083	66
Manderson	442	558	9,442	21
Meadow Creek and North	2,394	10,984	25,016	178
Murphy Dome	1,033	3,198	11,802	12
Mush Creek area	1,407	21,230	20,770	643
Neiber Dome	466	1,914	2,086	8
*Oregon Basin	5,796	71,120	48,880	208
Pilot Butte	474	6,166	3,834	34
Quealy	366	6,146	3,854	22
Rock River	401	30,682	4,318	29
Sage Spring Creek	489	3,674	6,326	28
*Salt Creek	4,203	360,499	59,501	1,276
Steamboat Butte	3,533	30,492	19,518	41
Sussex and West	4,165	13,364	23,636	123
Wertz	2,194	29,937	20,063	27
Winkleman Dome	1,358	9,031	10,969	21
Worland	687	12,939	20,061	32

(1) Includes Montana portion of the field.

TEXAS

(Data by Railroad Commission of Texas; fields included are all those producing 3,000 bbl. or more per day—figures include all pools in multipay fields. Cumulative figures have been adjusted to Railroad Commission totals.)

SOUTHWEST TEXAS

RAILROAD DIST. 1:				
Big Foot	2,552	8,054	36,946	528
Charlotte and North	2,110	16,421	20,379	365
Crown, East	639	640	12,360	144
*Darst Creek	3,610	87,881	47,119	499
*Luling-Branyon	2,966	103,923	26,077	774
Pearsall	943	8,173	13,827	164
RAILROAD DIST. 4:				
*Agua Dulce and Stratton	7,537	127,511	97,489	468
Borregas	3,440	13,216	26,784	160
Flour Bluff and East	909	23,073	11,927	109
Fulton Beach	1,408	11,072	23,928	164
Garcia	1,021	13,750	12,250	134
Government Wells, North	1,641	64,119	21,881	373
Hagist Ranch	923	1,670	14,330	81
Hoffman	1,477	28,518	16,482	447
Jennings and West	862	5,988	27,012	165
Kelsey and South	3,635	31,556	40,444	411
*La Gloria	3,902	59,178	90,822	213
London Gin	809	6,097	15,903	73
McAllen	1,102	5,267	14,733	30
Midway	1,220	19,619	12,381	104

TEXAS (Continued)

	1955 production	January 1, 1956 Cumulative	Estimated reserves	No. of wells
Mustang Island	2,826	11,787	23,213	135
Piedra Lumbre	981	12,238	14,762	135
*Plymouth and East	5,097	88,925	47,075	320
*Portilla	3,736	21,775	78,225	127
Red Fish Bay	1,289	6,262	29,738	80
Rincon and North and South	2,782	36,354	33,646	251
*Seeligson (all zones)	10,960	143,375	256,625	897
Seven Sisters	1,181	42,028	17,972	315
Sun and East and North	1,361	19,917	15,083	187
Taft	785	17,060	20,940	94
*Tijerina-Canales-Blucher	2,500	32,549	87,451	216
White Point, East	3,282	59,164	35,836	333
Willamar and West	2,510	35,605	39,395	263

TEXAS GULF COAST

RAILROAD DIST. 2:				
Berclair	757	4,015	15,985	101
Bloomington	1,302	13,772	24,223	126
Bonnie View	672	9,307	20,693	74
Burnell-Tulsita	3,127	27,417	27,583	127
Cottonwood Creek, South	981	3,349	16,651	54
Falls City	904	12,063	16,937	72
Francitas, North	1,698	11,896	13,104	68
*Greta and Deep	2,449	69,899	40,101	209
Helen Gohlke and West	2,319	10,545	39,454	173
Heyser	1,079	41,659	16,341	211
La Rosa	568	15,930	7,070	57
Lake Pasture	859	1,212	14,788	41
Lolita	1,368	27,327	16,673	239
Mary Ellen O'Connor	1,726	2,567	47,433	131
McFaddin	1,718	24,593	14,407	93
Placedo and East	1,223	40,316	25,684	260
*Refugio and North and Fox	2,379	74,479	75,521	261
Roche	613	6,518	11,482	46
Slick-Wilcox	577	12,965	7,035	43
Swan Lake	676	4,480	9,520	34
*Tom O'Connor	9,738	216,249	233,751	682
*West Ranch	5,602	96,752	153,248	619
RAILROAD DIST. 3:				
Amelia	1,147	24,099	10,901	116
*Anahuac	5,282	132,815	132,185	315
*Barber's Hill	2,032	102,873	27,127	165
Bay City	849	21,048	20,952	53
Bender	1,154	1,900	13,100	66
Big Hill	746	2,703	17,297	40
Boling	867	17,470	52,530	179
Chocolate Bayou	4,299	52,428	42,572	119
Clear Lake	570	14,614	10,386	34
*Conroe and West	9,995	352,405	247,595	828
Conroe Townsite	551	701	19,299	53
Damon Mound	1,215	12,648	13,351	128
Danbury Dome	895	8,347	19,653	87
Dayton, South	921	4,893	16,107	73
Deckers Prairie, South	598	1,749	13,251	50
Durkee	583	3,102	11,898	40
Esperson Dome	1,203	23,937	11,063	108
Fairbanks	1,381	36,146	13,854	244
Fannett	1,272	28,451	11,549	79
Fig Ridge	819	16,763	13,237	57
Gillock and East and South	3,610	50,942	39,058	221
*Goose Creek	2,911	93,715	43,285	327
Hankamer	980	12,927	17,073	97
*Hastings	11,655	264,706	235,294	643
High Island	3,185	42,558	27,442	137
Houston, South	1,334	26,437	13,563	82
*Hull and Merchant	5,918	136,871	53,129	433
*Humble	1,303	138,356	26,644	297
*Katy, North	9,151	87,111	67,889	129
Lake Creek	1,163	28,839	12,161	39
Liberty, South	2,840	31,097	30,903	208
Livingston	1,170	24,039	10,961	129
Lovell's Lake	854	20,993	19,007	106
*Magnet-Withers	1,407	60,002	44,998	228
Manvel	1,600	54,074	24,926	157
Markham, North-Bay City, North	2,077	16,020	21,980	130
Midfields and Townsite	532	5,405	14,595	42
Nona Mills	526	2,706	17,294	39
*Old Ocean	5,369	92,067	104,933	164
Orange	1,865	45,970	19,030	202
Oyster Bayou	3,073	36,264	33,736	47
Pierce Junction	1,284	59,232	15,768	113
Port Neches and North	1,507	21,243	15,757	115
Raccoon Bend	2,116	57,102	19,898	198
Red Fish Reef	576	7,950	12,050	36
Rose City	593	3,367	8,633	23
Saratoga and West	2,219	42,504	17,496	391
Silsbee	2,007	24,308	25,692	51
*Sour Lake	1,554	96,331	28,669	297
*Spindletop	544	133,885	16,115	127
Stowell	1,705	41,926	23,074	80
Sugarland	965	51,882	18,118	36
Sugar Valley	1,146	15,181	13,818	113
*Thompson and North and South	8,743	201,840	118,160	337
Tomball	2,833	59,244	22,756	418

TEXAS (Continued)

	1955 production	January 1, 1956 Cumulative	Estimated reserves	No. of wells
Trinity Bay	777	1,980	23,020	48
Village Mills, East	2,529	17,999	32,001	154
*Webster	10,572	212,057	237,943	206
*West Columbia (and New)	2,540	120,869	29,131	192
Withers, North	1,545	30,025	19,975	150
EAST TEXAS				
RAILROAD DIST. 5:				
Corsicana, Shallow	2,261	23,593	16,407	1,762
Pickton	1,449	9,939	20,061	166
*Powell	306	125,836	4,164	127
*Van	8,834	259,146	145,854	640
RAILROAD DIST. 6:				
Carthage	883	22,137	12,863	70
Chapel Hill	804	17,187	9,813	60
*East Texas	79,673	3,159,667	1,950,333	20,240
*Hawkins	16,843	200,063	324,937	621
Long Lake	971	38,534	13,466	146
*Neches	3,500	4,433	95,567	245
New Hope	2,570	22,669	30,331	70
Pewitt Ranch	1,135	7,705	15,295	118
Pine Mills and East	680	5,106	6,894	87
Quitman	2,352	32,982	27,018	167
Rodessa (see North Louisiana)				
*Talco	5,022	152,802	77,198	689
Waskom	1,177	8,206	16,794	132
Woodlawn	1,002	2,544	22,456	96
NORTH AND WEST CENTRAL TEXAS				
RAILROAD DIST. 7-B:				
Coleman County:				
Glen Cove	901	3,603	11,397	86
Goldsboro	1,090	2,304	17,696	195
Fisher County:				
Claytonville	1,035	3,184	6,816	48
Pardue	866	5,756	9,244	76
Round Top	1,391	13,033	16,967	187
Nolan County:				
Dora, North	862	1,313	13,687	52
Hylton, Northwest	736	2,083	12,917	37
Lake Trammel, West	824	1,075	13,925	55
White Flat	1,255	3,214	16,786	80
Stonewall County:				
Boyd	1,178	3,444	11,556	62
Flowers	2,075	4,999	20,001	185
Old Glory	1,041	4,672	10,328	96
RAILROAD DIST. 9:				
Archer County:				
Hull-Silk-Sikes	1,640	48,105	21,895	444
Vogtsberger and North and South	852	9,383	13,617	172
Clay County:				
Joy	805	10,283	10,717	206
McKinlay	1,304	2,416	17,584	127
Cooke County:				
Sivell's Bend	845	10,652	9,348	61
Walnut Bend	3,441	40,001	49,009	356
Grayson County:				
Big Mineral Creek	2,043	3,675	21,325	125
Sadler	1,310	5,131	14,859	124
Sherman and East and Southwest	2,948	12,028	37,972	301
Jack County:				
Bryson, East	821	7,559	12,441	96
Knox County:				
Katz	3,330	11,096	38,904	208
Knox City, North	749	3,514	4,486	52
Montague County:				
Hildreth	816	16,862	13,138	144
Wichita County:				
*Burkburnett	2,562	181,909	72,091	1,562
*Electra	2,258	175,982	40,018	2,845
*K-M-A	3,025	104,269	80,731	1,650
Wilbarger County:				
Fargo	1,485	12,075	20,925	139
Young County:				
Langston-Kleiner	1,214	3,338	15,662	218
WEST TEXAS				
RAILROAD DIST. 7-C:				
Amacker-Tippett	827	1,200	18,800	21
Benedum	2,871	20,011	39,989	228
*Big Lake and South and West	936	114,715	17,285	172
Bronte	877	4,632	10,368	85
Cree-Sykes, East	1,374	9,006	20,994	176
Elkhorn	1,217	5,365	14,635	51
Fort Chadbourne	4,359	19,846	20,154	204
Hulldale	1,705	6,885	33,115	100
Jameson (Strawn and Reef)	7,691	13,136	71,864	611
*McCamey	2,087	94,534	55,466	935
*Pegasus	5,588	26,196	120,804	233
*Spraberry Trend Area	20,785	117,136	282,864	2,246
Todd Deep	2,500	34,652	35,348	104
Wilshire	2,972	15,428	44,572	45
World	1,188	22,047	17,953	190

TEXAS (Continued)

	1955 production	January 1, 1956 Cumulative	Estimated reserves	No. of wells
RAILROAD DIST. 8:				
Abell	1,369	16,696	23,304	135
Adair	2,239	14,957	25,043	172
Amrow	942	1,246	6,754	15
*Andector	5,618	44,890	65,110	132
Andrews	1,450	1,580	18,420	77
Anton-Irish	2,884	19,676	28,324	185
Block 12 and East	1,219	4,245	25,755	33
Block 31	5,210	31,198	53,802	66
Brahaney	817	1,177	13,823	83
Bronco, Sil.-Dev.	1,039	1,827	18,173	14
Cedar Lake	1,582	15,865	29,135	176
*Cogdell	6,507	39,893	95,107	377
*Cowden, North and South	9,111	156,944	93,056	1,252
Deep Rock	1,248	3,260	24,740	55
*Diamond "M"	9,343	58,687	126,313	562
*Dollarhide	5,232	80,903	89,097	330
Dora Roberts	1,059	1,093	24,907	26
Embar	1,233	16,383	16,617	39
Emma	2,097	11,399	29,601	124
Fluvanna	1,003	1,751	15,249	47
Fort Stockton	1,330	6,991	18,009	279
*Foster	4,779	86,391	50,609	650
Fuhrman-Mascho	2,366	21,771	37,229	390
*Fullerton and North and South	6,728	111,931	163,069	742
Garza	2,682	27,002	30,998	487
*Goldsmith (all fields)	15,744	201,563	225,437	2,271
Good	1,292	9,796	17,204	48
Harper	1,532	13,516	20,484	220
Headlee	3,615	5,948	64,052	70
*Hendrick	1,381	221,347	30,653	233
*Howard-Glasscock	7,647	177,017	80,983	1,174
Huntley	765	936	11,064	71
Hutex	593	1,112	10,888	12
Iatan-East Howard	1,226	33,125	18,875	503
Jo-Mill	897	1,003	4,997	58
Jordan	3,504	44,970	42,030	391
*Kelly-Snyder	21,773	154,968	645,032	1,362
Kermit	2,927	46,781	33,219	599
*Keystone and South	10,667	146,101	207,899	962
Lea	1,508	2,229	22,771	49
*Levelland	9,556	84,147	124,853	2,043
Luther, Southeast	964	1,407	13,593	30
Mabee	1,021	10,710	14,290	109
Magutex	1,810	3,140	41,860	49
Martin	2,074	22,076	37,924	95
*McElroy	6,912	247,956	102,044	1,048
Means and East	3,091	26,864	45,136	427
*Midland Farms	6,962	39,215	70,785	391
Moore	835	1,770	13,230	150
Nolley	993	2,013	13,987	59
Oceanic	1,446	2,557	17,443	47
Pecos Valley (all fields)	1,272	9,248	15,752	448
Penwell	1,621	36,996	23,004	242
Prentice	5,615	13,651	66,349	336
Prichard	833	1,700	11,300	20
Reinecke	1,569	13,179	23,821	70
Riley, North	812	4,404	11,596	61
Robertson	1,018	5,661	15,339	183
Russell and North	5,539	16,252	53,748	232
S-M-S	1,081	1,367	18,633	68
Salt Creek	4,002	16,293	58,707	109
*Sand Hills	3,111	55,476	74,524	588
*Seminole and West	5,524	87,713	92,287	424
Shafter Lake and North	4,051	24,233	60,767	399
Sharon Ridge	1,502	19,284	58,716	996
*Slaughter	11,277	221,547	219,453	2,531
Snyder	998	5,599	15,401	54
Three Bar	1,218	11,850	15,150	64
Toberg	1,021	26,267	33,733	695
Triple N	1,247	3,121	24,879	28
*TXL	9,214	132,118	142,882	309
University Block 9	1,813	2,207	22,793	51
University-Waddell	802	6,879	15,121	45
Vealmoor and East	2,493	22,168	52,832	168
Virey	1,317	1,725	23,275	31
Von Roeder and North	1,043	5,036	24,964	48
Waddell	1,310	25,288	17,712	249
*Ward, South	4,300	58,792	66,208	837
*Ward-Estes, North	4,512	85,995	47,005	1,026
War-San	757	1,063	13,937	19
*Wasson and 66 and 72	13,673	306,453	343,547	1,751
Welch	1,318	22,663	20,337	205
Wellman	1,646	6,924	18,076	30
Westbrook	1,321	17,451	11,549	296
Wheeler and Northwest	954	21,556	23,444	73
Yarbrough and Allen	2,224	11,211	28,789	69
*Yates	9,884	431,023	368,977	644
TEXAS PANHANDLE				
RAILROAD DIST. 10:				
*Badger	3,649	82,936	40,064	1,201
*Borger-Pantex	3,520	128,132	46,868	764
*Finley	3,675	108,243	51,757	600
*West Pampa	3,454	115,542	44,458	1,115
Quinduno	1,479	3,428	24,572	138

Middle East shows biggest gains as . . .

Free-World Production Jumps 11 Per Cent

by Paul Swain

LED by the prolific Middle East and Latin America and nurtured by the zooming petroleum demand that has accompanied industrial booms all over the globe, the free world's production of oil in 1955 jumped 11.0 per cent over the previous record set in 1954.

Production outside the United States showed the biggest jump in 1955 as petroleum demand in Europe, Asia, and Latin America gave foreign production its greatest impetus. The fields of the Middle East showed the biggest gains with a boost of 18.2 per cent over the previous year. Latin America followed the Middle East lead with a gain of 14.0 per cent, and western Europe, headed by France as she developed new fields, showed a gain of 12.9 per cent. The Asian and Pacific areas showed the smallest regional gain, but it was 5.8 per cent.

The over-all gain in oil production outside the Communist-dominated areas of the world was 15.4 per cent.

Estimated gains in crude producing in those areas behind the Iron Curtain were an over-all 4.7 per cent over the production estimated for 1954. Very little concrete information on oil activities is released by the nations in the Soviet orbit and these production figures are the best estimates of the industry, based on fragmentary reports and past knowledge of producing areas.

Reserves stand 22.5 per cent above the 1954 figures with most of the increase coming from the Middle East where development of fields and new discoveries have increased estimates of already vast petroleum reserves.

Refining's gain on a world-wide basis was more modest, but sizable even so—6.2 per cent.

World Crude-Oil Production and Reserves

Country—	Production (thou. bbl. daily) 1955 (partly est.)	1954	Per cent change	Est. crude-oil reserves (million of bbl.)	Ref. cap. (thou. bbl. per stream day)
W. Hemisphere:					
Argentina	83.0	81.3	2.1	400.0	189.1
Bolivia	7.4	4.6	60.9	50.0	12.3
Brazil	5.5	2.7	103.7	27.0	105.8
Canada	354.1	263.2	34.5	2,208.0	608.7
Chile	7.0	4.8	45.8	25.0	20.0
Colombia	108.0	108.6	—0.6	580.0	39.5
Cuba	1.1	0.1	1,000.0	3.0	7.7
Ecuador	9.7	8.6	11.3	25.0	6.0
Mexico	248.1	229.2	8.2	1,900.0	408.5
Netherlands West Indies					640.0
Peru	47.2	47.0	0.4	225.0	47.5
Trinidad	68.5	64.7	5.9	280.0	115.0
Uruguay					28.0
Venezuela	2,150.0	1,895.3	13.4	12,000.0	548.7
Total	**3,089.6**	**2,710.1**	**14.0**	**17,723.0**	**2,776.8**
Middle East:					
Aden					120.0
Bahrain	30.1	30.1	0	205.0	186.5
Iran	321.0	60.3	432.3	27,000.0	594.4
Iraq	688.0	627.6	9.6	20,000.0	46.8
Israel				1.0	85.0
Kuwait	1,100.0	952.3	15.5	40,000.0	30.0
Lebanon					20.5
Neutral Zone	24.9	15.6	59.6	500.0	0
Qatar	115.0	100.5	14.4	1,500.0	0.6
Saudi Arabia	960.0	953.0	0.7	37,000.0	189.0
Total	**3,239.0**	**2,739.4**	**18.2**	**126,206.0**	**1,272.8**
Asia-Pacific:					
Australia				1.0	161.7
British Borneo	106.7	101.0	5.6	500.0	47.3
Burma	4.0	4.1	—2.4	45.0	3.0
Formosa					15.0
India	7.2	6.1	18.0	60.0	73.7
Indonesia	237.0	222.1	6.7	2,300.0	223.8
Japan	6.2	5.8	6.9	22.0	189.5
New Guinea	9.5	10.3	—7.8	50.0	0
Pakistan	5.7	6.2	—8.1	22.0	4.0
Philippines					13.0
Total	**376.3**	**355.6**	**5.8**	**3,000.0**	**731.0**
Western Europe and Africa:					
Algeria	1.1	1.4	—21.4	5.0	0
Austria*	62.5	59.5	5.0	400.0	
Belgium					130.1
Denmark					0.9
Egypt	34.5	37.7	—8.5	150.0	53.0
France	18.1	9.6	88.5	120.0	526.3
French Morocco	2.1	2.4	—12.5	14.0	2.1
West Germany	60.8	51.9	17.1	495.0	272.2
Italy (inc. Sicily)	4.3	1.5	186.7	110.0	455.6
Netherlands	19.5	17.9	8.9	95.0	237.0
Norway					1.8
Portugal					25.4
Spain					85.7
South Africa					17.3
Sweden					35.8
Switzerland					4.0
Turkey†	4.4	1.1	300.0	65.0	6.9
United Kingdom	1.1	1.2	—8.3	5.0	597.4
Yugoslavia*	4.0	4.0	0	36.0	11.5
Total	**212.4**	**188.2**	**12.9**	**1,495.0**	**2,463.0**
Total non-Communist foreign	**6,917.3**	**5,993.3**	**15.4**	**148,424.0**	**7,243.6**
United States	**6,777.0**	**6,346.0**	**6.8**	**31,491.0**	**8,643.5**
Total free world	**13,694.3**	**12,339.3**	**11.0**	**179,915.0**	**15,887.1**
Est. Russia and other Communist-controlled areas‡	1,411.2	1,347.6	4.7	10,833.0	1,481.0
Total world	**15,105.5**	**13,686.9**	**10.4**	**190,748.0**	**17,368.1**

*Austria and Yugoslavia for the first time are not listed as a part of the U.S.S.R.-dominated area. †Turkey was previously listed as a part of the Middle East subtotal. ‡Includes following daily estimated production: U.S.S.R., 1,253,200; Rumania, 125,000 bbl.; Albania, 3,500 bbl.; China, 6,000 bbl.; Czechoslovakia, 2,500 bbl.; Hungary, 16,000 bbl.; and Poland, 5,000 bbl.

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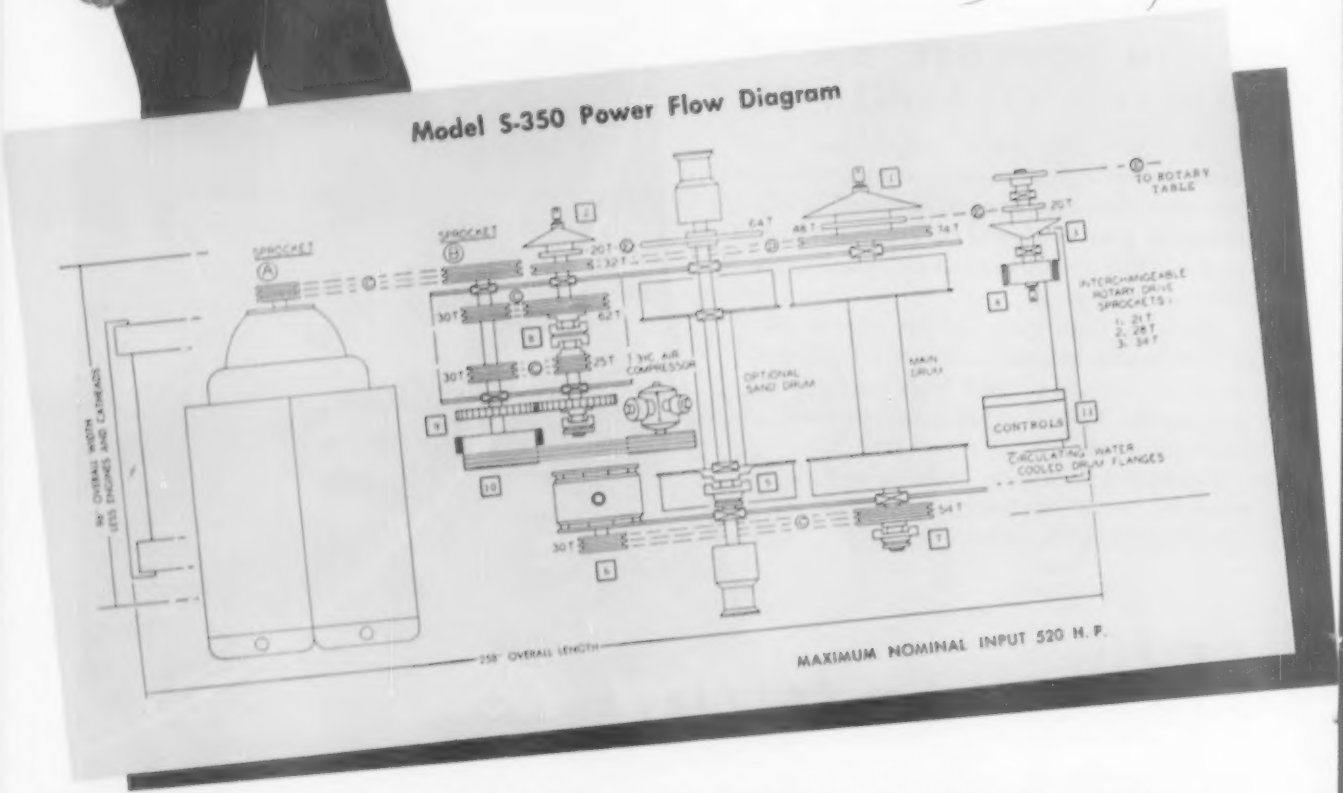

Here are the design highlights . . . J-450 and S-350 Draw Works

1. Air Friction Clutch Drive for Main Drum.
2. Air Friction Clutch Drive to Cathead Shaft.
3. Air Friction Clutch—Rotary Drive.
4. Rotary Table Brake.
5. Sand Line Drum, Air-Controlled Jaw Clutch.
6. Optional 22" Hydromatic Brake.
7. Automatic Release Jaw Clutch on Hydromatic Brake Drive.
8. Two-Speed Transmission, Air-Controlled Jaw Clutch.
9. Optional Constant Mesh Reverse Gear with Air-Controlled Jaw Clutch.
10. Air-Controlled Inertia Brake for Transmission Shifting.
- *11 Fawick P. T. O. Clutches for Alignment and Removal of Engines.
- *12 Optional Pump Drive—Air Friction Clutch.

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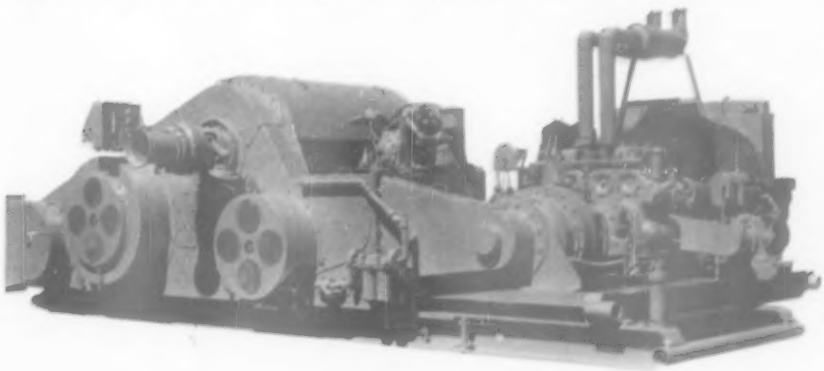
Model J-450
Twin-Engine Draw Works

Here, Cardwell engineers present a completely integrated design, which takes full advantage of high-strength alloys to provide a rig of light weight, while retaining ample safety factors for its nominal rating.

These sound basic designs can be readily expanded as your future requirements develop. This machinery has a pleasing symmetrical appearance, yet is strictly functional in its concept. The equipment is easy to keep clean, yet every working part is readily accessible from the outside.

This flexible unit was designed with convenience and low maintenance in mind.

Model S-350 Single-Engine Draw Works



The Model S-350 single engine torque converter draw works combines the latest in design features. It can serve as a compact, powerful split rig if desired.

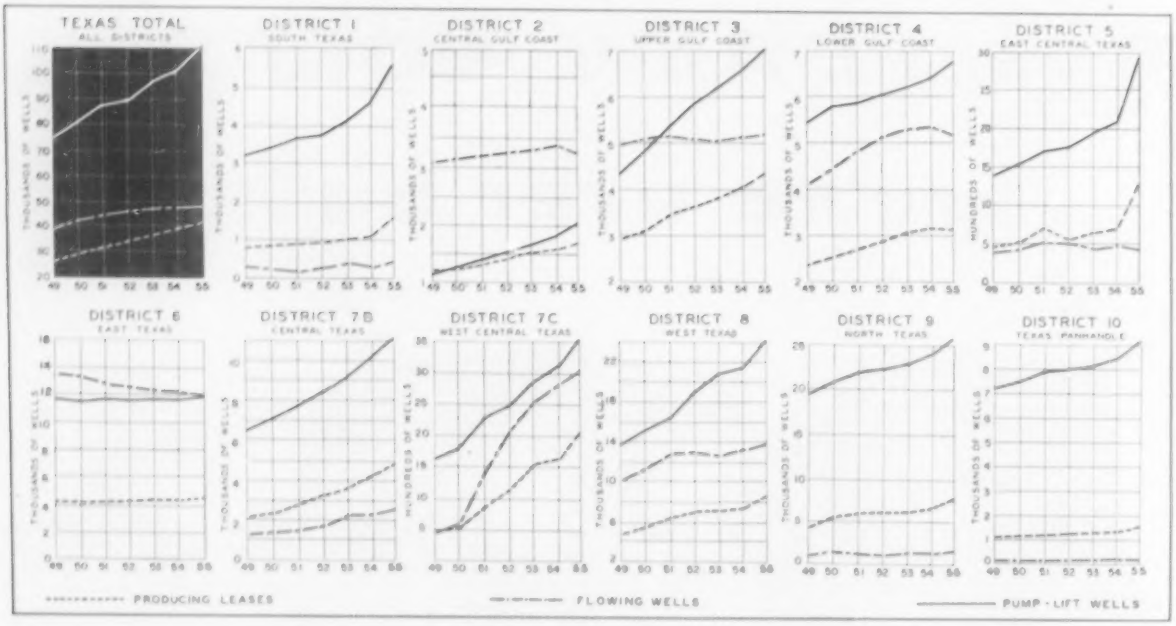
The hoist portion of the Model S-350 is identical with that in the Model J-450, and will receive the same accessories.

CARDWELL MANUFACTURING COMPANY, INC., WICHITA, KANSAS, U. S. A.

CARDWELL

REG. U. S. TRADEMARK PATENT OFFICE

*J-450 Only.



27,420 Wells to Go on Pump in '56

Over half of this record number of artificially lifted wells are credited to Texas and Oklahoma

MORE wells will be put on artificial lift in 1956 than in any other year on record. The 27,420 wells to be put on pump this year will be slightly higher than the total for 1955 and about 2,000 higher than the total for 1954.

Increased drilling in 1956 will account for the increase in wells put on pump. A large number of new wells will be put on pump immediately upon completion while many of the new and old flowing wells will require pumping during the year. The estimate includes both new pumping wells and converted flowing wells.

More development . . . Although wildcat-well drilling will be on the increase this year, much of the increase in drilling tempo will be due to field development. A majority of the wells drilled to develop fields will be put on pump immediately. Most wells fractured in the development areas will go on pump within the year.

Depth of lift is expected to increase slightly over average depths of the past 2 years. This increase in depth results from greater development of deeper pools. Some shallower pools that have yielded a large number of pumping wells in the past few years because of hydraulic fracturing will have fewer pumping wells this year. Areas, such as the Illinois basin, Southeast Kansas, and Northeast Oklahoma, may have an increase in the number of shallow wells to go on pump.

Active areas . . . On the whole, distribution of new pumping wells will be about the same as that last year, throughout the oil country. Major demand will be in the six states of California, Illinois, Kansas, Louisiana, Oklahoma, and Texas. Most of these states will have some increases in new pumpers over the new pumpers last year. In Texas the number of new pumping wells will be about the same as in 1955, but this is an increase of about 1,000 wells over the new pumping wells in 1954.

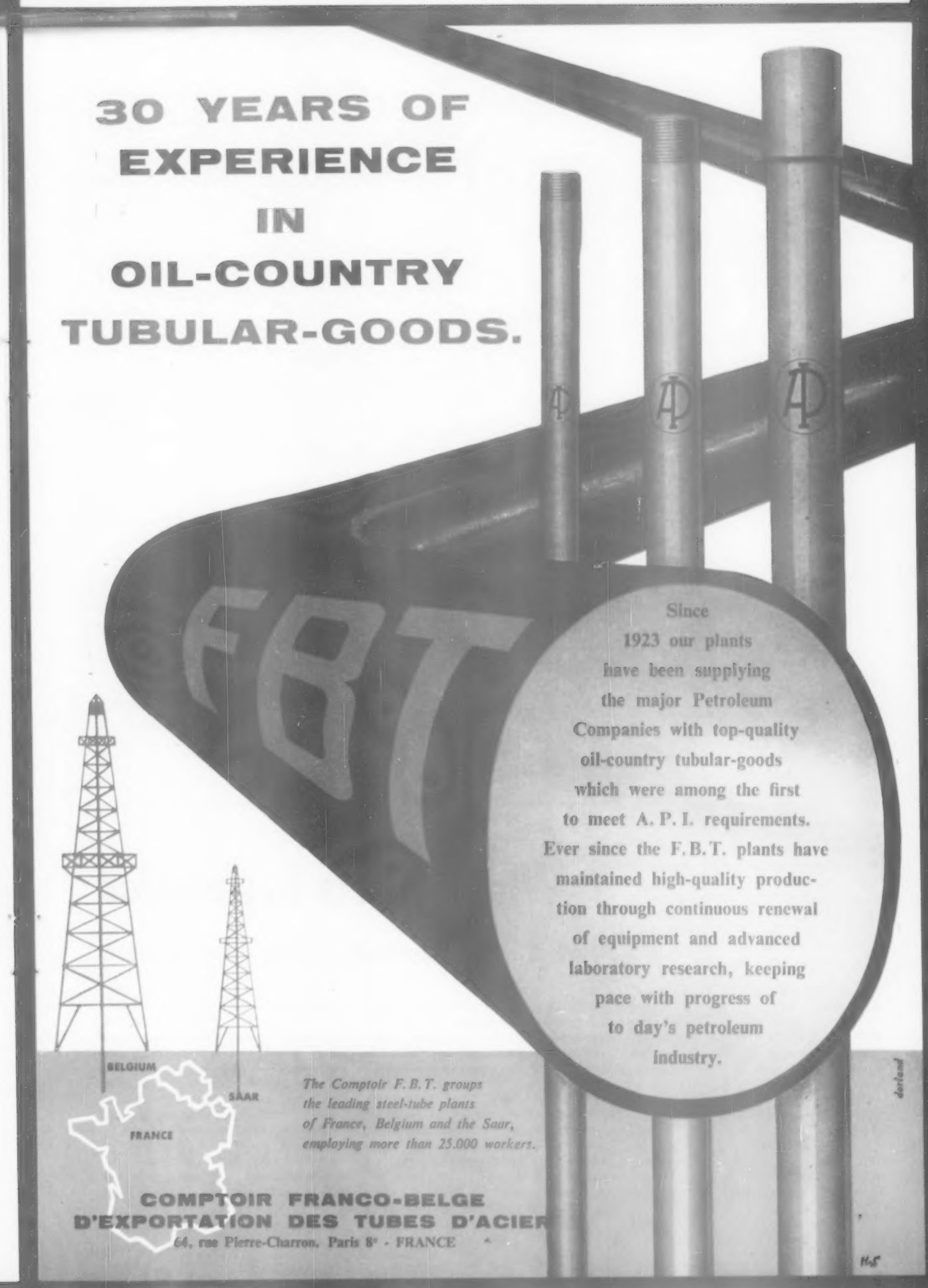
Other active areas contributing to the increase in the yearly total of new pumping wells will include Arkansas, Colorado, Kentucky, New Mexico, Ohio, and Wyoming.

ARTIFICIAL LIFT FORECAST, 1956

	Estimated	
	1956	1955
Alabama	20	10
Arkansas	340	260
California	1,890	1,820
Colorado	590	570
Illinois	2,100	2,090
Indiana	310	360
Kansas	2,040	2,040
Kentucky	620	530
Louisiana	1,940	1,850
Michigan	170	180
Mississippi	160	170
Montana	170	150
Nebraska	250	280
New Mexico	650	590
New York	160	220
North Dakota	50	50
Ohio	500	410
Oklahoma	4,180	4,130
Pennsylvania	320	300
Texas	10,220	10,210
Utah	30	10
West Virginia	70	70
Wyoming	610	480
Other*	30	30
Total U. S.	**27,420**	**26,810**

*Includes Arizona, Florida, Idaho, Iowa, Missouri, Nevada, Oregon, South Dakota, Tennessee, and Washington.

30 YEARS OF EXPERIENCE IN OIL-COUNTRY TUBULAR-GOODS.



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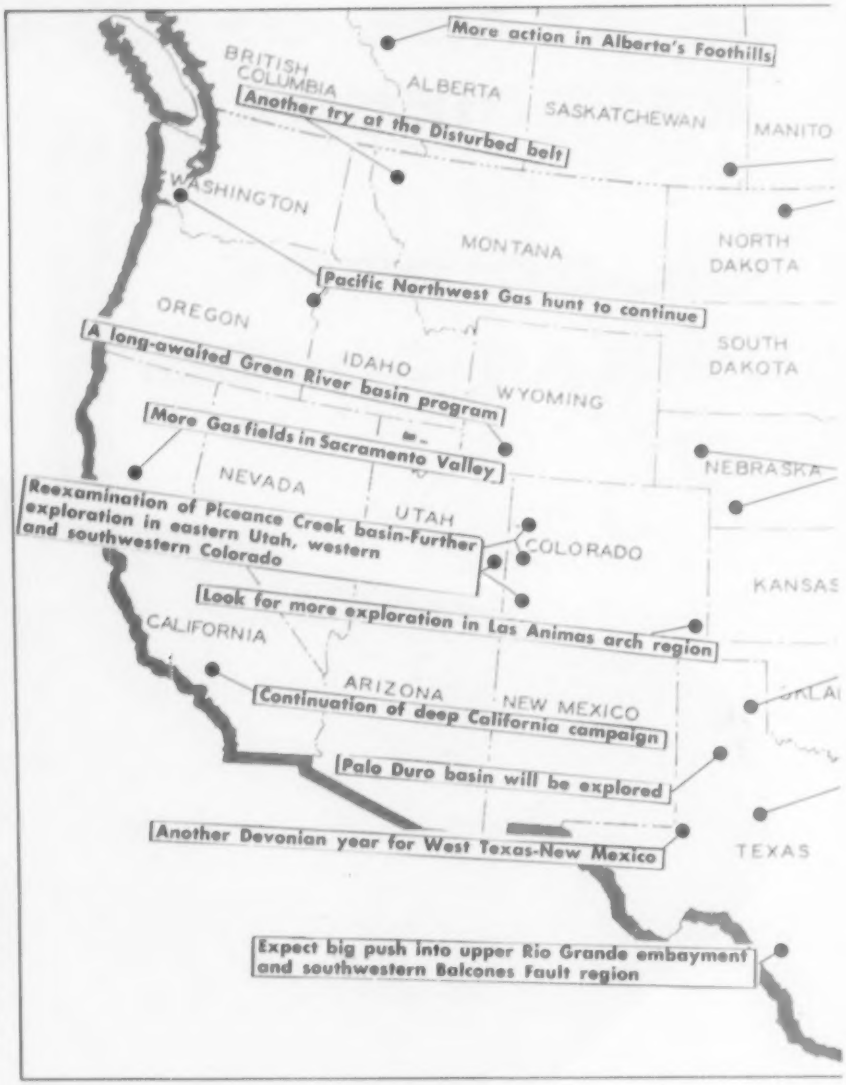


Where 1956 Exploration

Mark these areas well . . . you'll be reading

LACK of large new reserves coupled with a smaller number of undrilled development areas will force the industry to drill more wildcats this year and next in order to open new prospects for development to meet the country's petroleum needs.

Last year proved disappointing from the new-reserve standpoint, and prospects uncovered in the past 36 months are rapidly becoming saturated with development wells. This year's record drilling will keep 2,800-3,000 rigs busy in the United States and Canada. The accompanying map indicates The Oil and Gas Journal's exploration predictions for 1956.

Gulf Coast . . . Seismic exploration in offshore areas has passed its peak, and the vast sums of exploration money spent in this water prospecting will be shifted to land areas to find lucrative drilling prospects.

Exploratory and development drilling in offshore and inland areas of Coastal Louisiana will shift into high gear this year, moving farther away from land, and into deeper waters. There were nearly 300 active locations in South Louisiana at the first of 1956, promising another highly active and successful exploratory year in that province.

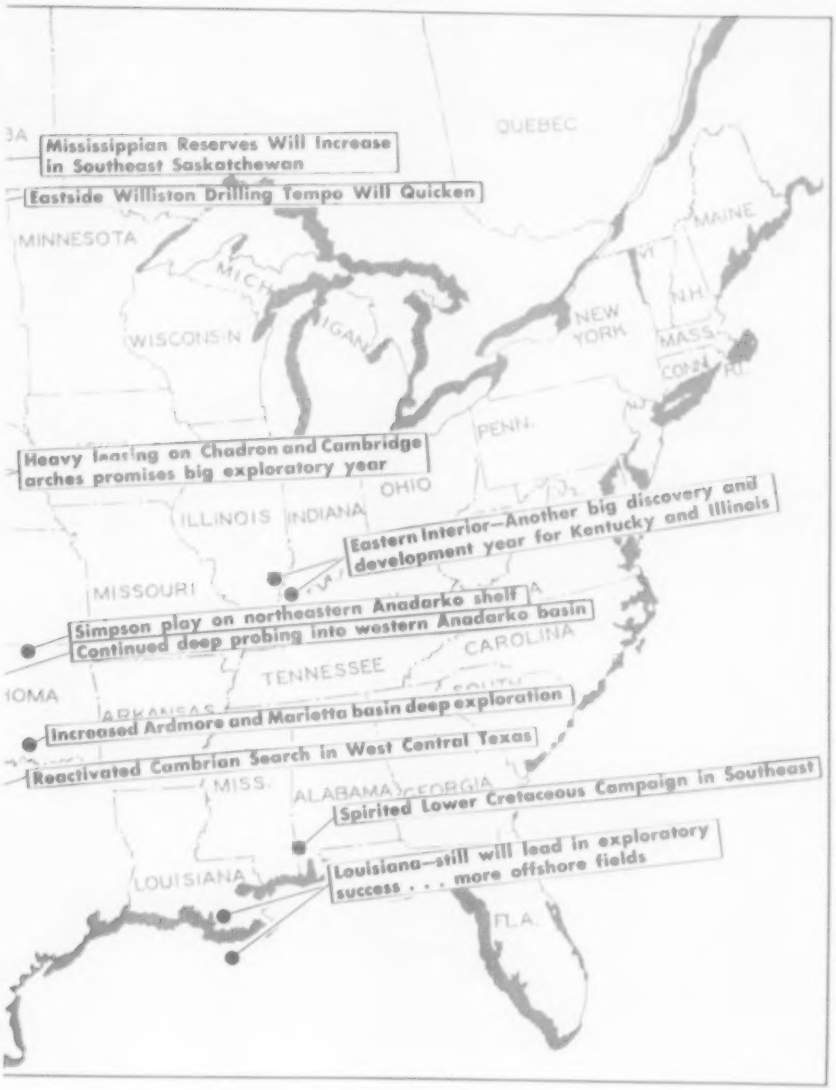
West Texas-New Mexico . . . Based on 1955 discoveries, the Devonian prospects of this province will grow brighter this year. A late-year Cambrian discovery in West Central Texas promises further exploration for Cambrian production in this area.

Southwest Texas . . . Exploratory and development drilling along the southwest end of the Balcones Fault zone will highlight this region's activitiy. More exploration in the upper Rio Grande embayment can be expected. Last year's success in the Val Verde basin shed new light on this area's prospects. A busy year is in prospect for the Starr, Hidalgo, Cameron, and Webb County area of the lower Rio Grande Valley. No letup is in sight for the Navarro-Olmos sand campaign in Atascosa and Frio counties.

Mid-Continent . . . Oklahoma's exploratory guns will be pointed to the Ardmore and Marietta basins this year. The western reaches of the Anadarko basin will be probed with more vigor than last year, and indications are that rigs will move into Texas' Palo Duro basin. The Chadron and Cambridge arches of Nebraska will definitely be in the 1956 wildcat story. The basal Pennsylvanian sand upsurge in northern Oklahoma is promised further extension this year.

Hugoton embayment . . . The Oklahoma and Texas panhandles will see further expansion of the Morrow and other Pennsylvanian reservoirs that were uncovered last year in southwestern and southeastern Beaver County, Oklahoma, and nothern Ochiltree County, Texas. Some new pre-Permian discoveries inside Hugoton field can be looked for.

Williston basin . . . Both the east and west sides of this big basin will see



News Will Be Made

more about them in the weeks to come

Exploration in 1956 will thrust into two principal directions . . . northwestward through the Rocky Mountains, and southeast down through Dixie.

action this year. More deep Ordovician fields will be opened in eastern Montana, and possibly in western North Dakota. Success in Renville and Burke counties, North Dakota, last year has sparked new vitality into east-side Williston exploration. More Madison pools will open up on the southern end of the Nesson anticline. Substantial additions to southeastern Saskatchewan's Mississippian oil reserves are indicated as a result of excellent success in 1955.

Western Canada . . . More foothills exploration is slated for Alberta. This winter's seismic work in the northwestern reaches of that province and in British Columbia may mean important wildcatting for the region later this year.

An increase in drilling on the plains of Alberta and Saskatchewan will open important new oil and gas-producing areas. The Olds area of Alberta will possibly see some new "Westward Ho's and Sundres." A late-year oil discovery in the Peace River area further enhances the development of the primarily gas-producing region.

Rocky Mountains . . . The main centers of exploratory interest in this province will be the western slopes of the Colorado Rockies, the Piceance Creek basin, the Green River and San Juan basins. As usual, the Denver-Julesburg basion of Colorado and western Nebraska will be in first place in the number of wildcats. It appears that both states will share in the Denver-Julesburg race, but a definite increase in Nebraska drilling is in line. The Clark Fork area of Carbon County, Montana, attracted considerable interest late in 1955. A Lakota discovery there offers good chances of big development in an untested area. The Weber-Pennsylvanian sand discovery at Thornburg in northwest Colorado will put this region into the exploratory scene in 1956.

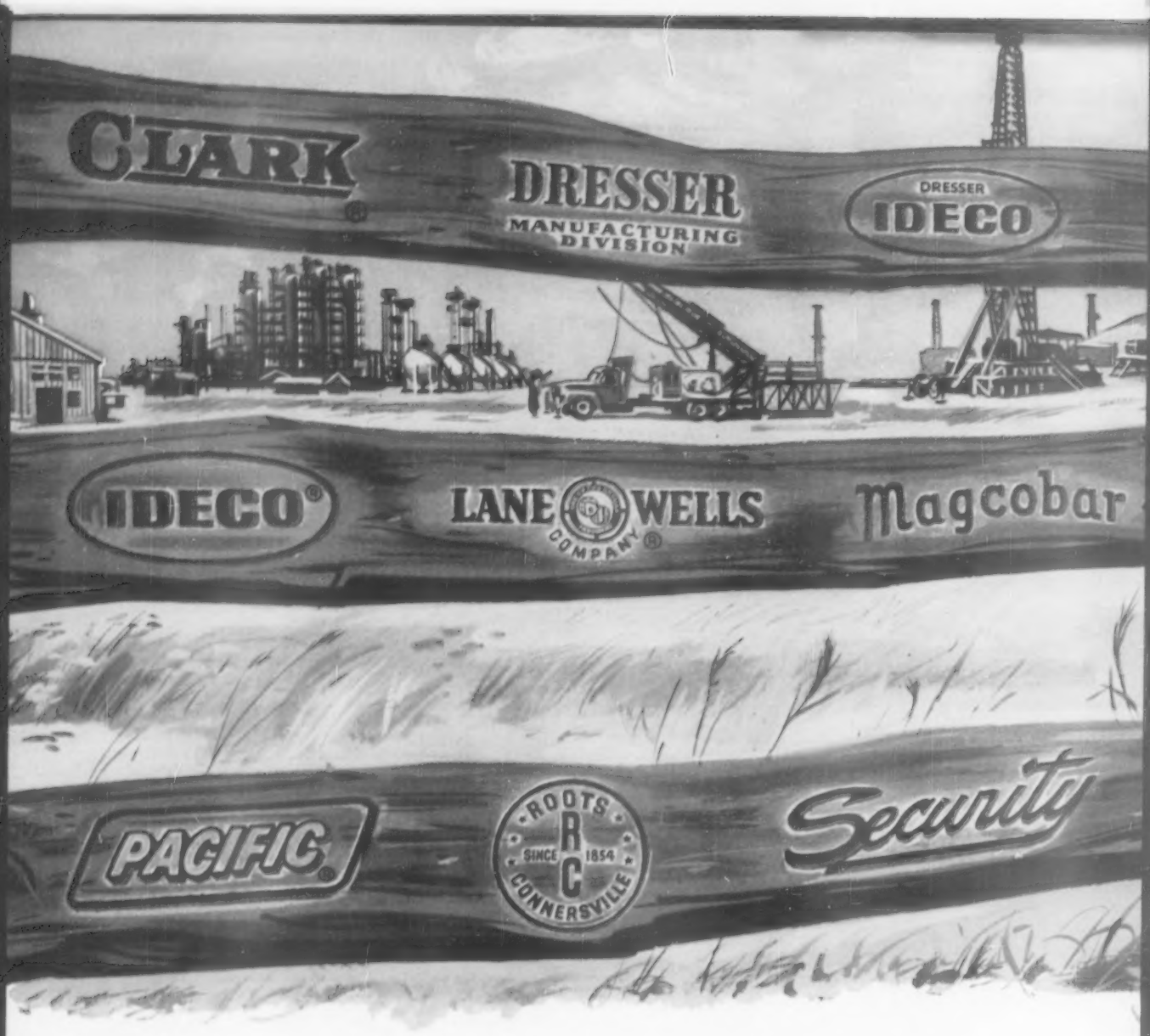
Southeastern states . . . The success at Citronelle in Alabama last year has sparked an active drilling campaign in the Southeast for Lower Cretaceous production

Eastern Interior . . . Another big exploratory and development year is in store for the Illinois basin. The southern and northern sections of this basin will be the most active. New drilling and production records will likely be set in Illinois and western Kentucky.

Pacific Coast . . . Two drilling themes will feature California drilling—a continuation of deep drilling in and around older producing areas of the coastal basins and San Joaquin Valley, and a marked increase in gas exploration in the Sacramento Valley.

Pacific Northwest . . . Wildcatting will continue in Washington, Oregon, and Idaho. The heaviest drilling appears slated for Washington.

The search for gas production in the Northwest will center along the Oregon-Idaho border in the Vale-Ontario basin.



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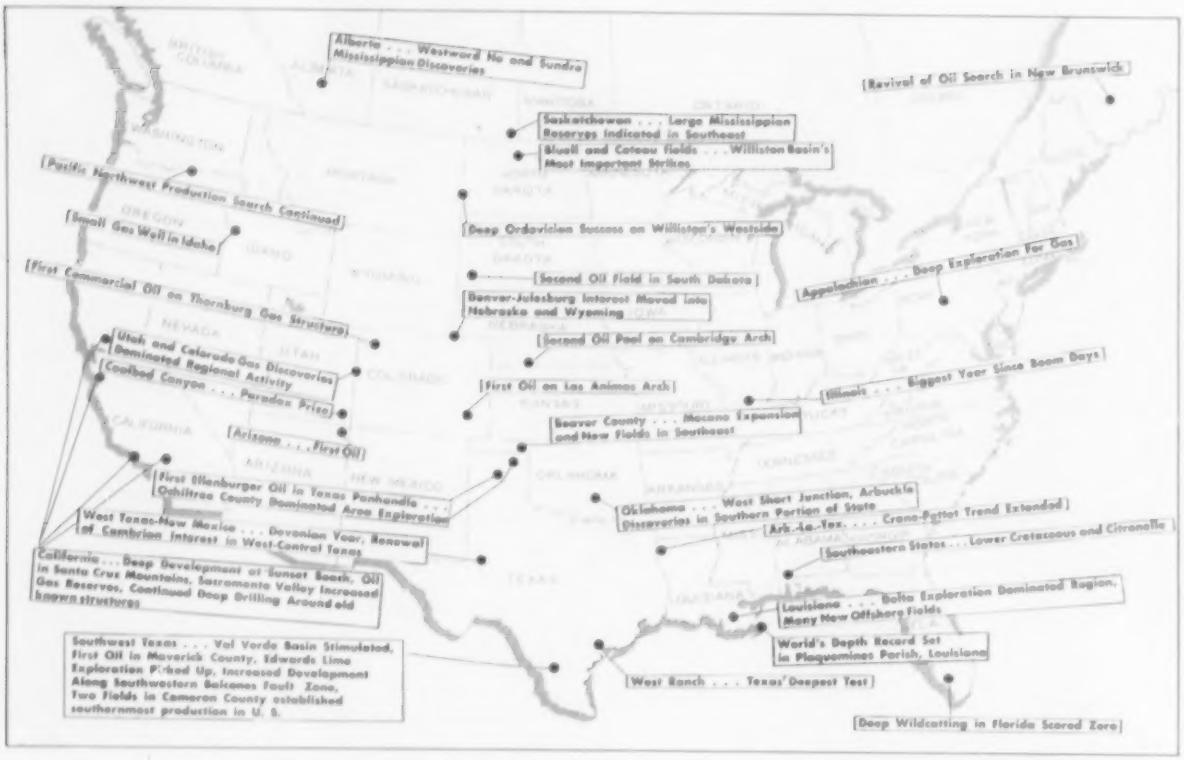

Alberta . . . Westward Ho and Sundre Mississippian Discoveries
Revival of Oil Search in New Brunswick
Saskatchewan . . . Large Mississippian Reserves Indicated in Southeast
Bluell and Cotaau fields . . . Williston Basin's Most Important Strikes
Pacific Northwest Production Search Continued
Small Gas Well in Idaho
Deep Ordovician Success on Williston's Westside
First Commercial Oil on Thornburg Gas Structure
Second Oil Field in South Dakota
Beaver-Juleaburg Interest Moved Into Nebraska and Wyoming
Appalachian . . . Deep Exploration For Gas
Second Oil Pool on Cambridge Arch
Utah and Colorado Gas Discoveries Dominated Regional Activity
Coalbed Canyon . . . Paradox Price
First Oil on Las Animas Arch
Illinois . . . Biggest Year Since Boom Days
Beaver County . . . Hocano Expansion and New Fields in Southeast
Arizona . . . First Oil
First Ellenburger Oil in Texas Panhandle . . . Ochiltree County Dominated Area Exploration
Oklahoma . . . West Short Junction, Arbuckle Discoveries in Southern Portion of State
Ark.-La.-Tex. . . . Crane-Pettet Trend Extended
West Texas-New Mexico . . . Devonian Voor, Renewal of Cambrian Interest in West-Central Texas
Southeastern States . . . Lower Cretaceous and Citronelle
California . . . Deep Development at Sunset Beach, Oil in Santa Cruz Mountains, Sacramento Valley Increased Gas Reserves, Continued Deep Drilling Around old known structures
Louisiana . . . Delta Exploration Dominated Region, Many New Offshore Fields
World's Depth Record Set in Plaquemines Parish, Louisiana
Southwest Texas . . . Val Verde Basin Stimulated, First Oil in Maverick County, Edwards Lime Exploration Picked Up, Increased Development Along Southwestern Balcones Fault Zone, Two Fields in Cameron County established southernmost production in U. S.
West Ranch . . . Texas' Deepest Test
Deep Wildcatting in Florida Scored Zero

These areas excited oil finders and wildcatters, and were

Headline Makers in 1955 Exploration

THE exploratory map of the United States and Canada was "four-cornered" with success in 1955. The wildcat drill took the oil hunters into New Brunswick on the northeast side, to Canada's Northwest Territories on the northwest, to the offshore waters of Florida on the southeast, and to the Rio Grande on the southwest. Pin pointed on the map above and summarized in the paragraphs below are the exploratory stories of the year.

Pacific Coast . . . Exploration in California accented the deep. West Coast operators were busy digging around and in famous old fields. These deep wildcats are turning up nearly all of the state's new top-grade crude reserves.

Southwest Texas . . . The year's exploratory events took place along the southwestern end of the Balcones fault zone in the upper Rio Grande embayment.

Ark.-La.-Tex. . . . The extension of the Crane-Pettet trend in eastern Texas and northwestern Louisiana keynoted exploratory and development work in this province. A big Smackover year for the area was recorded.

Gulf Coast . . . The most successful wildcat region in the country was again South Louisiana, both on and offshore. The Mississippi River Delta region was dotted with many new fields.

West Texas-New Mexico . . . Devonian discoveries dominated the exploratory scene in this province, rather than the Ellenburger as in previous years. Most West Texas strikes followed the fields along the east side of the Central Basin Platform.

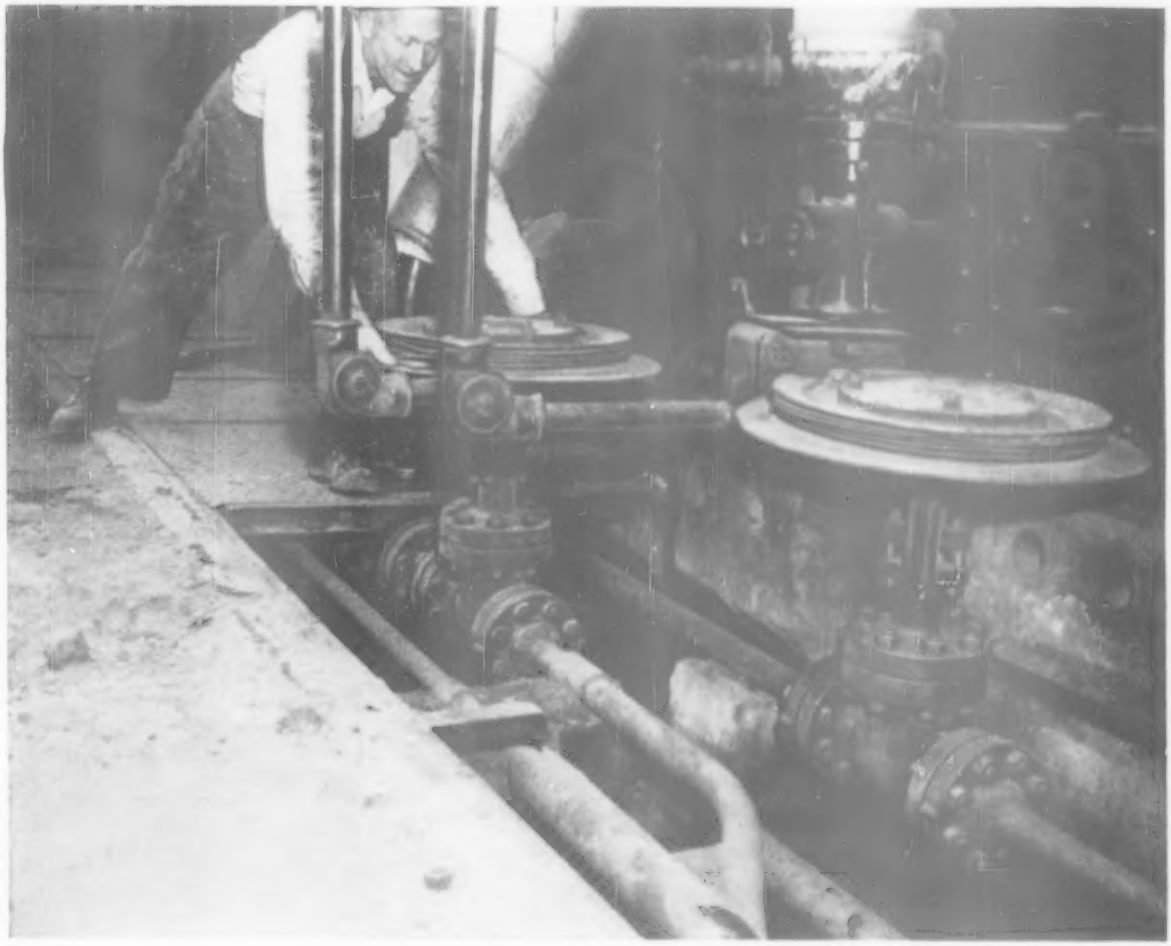
Rocky Mountains . . . Important discoveries in this province were limited to the Williston basin and the western slopes of the Rockies. The discovery of the year for the province was Sohio Petroleum Co.'s 1 Ritter in Renville County, North Dakota, the opener of Bluell field.

Southeastern states . . . One of the most important discoveries of the year was made in southwestern Mississippi's Hancock County area. This Lower Cretaceous oil strike plus one in Alabama's Citronelle area sparked intense interest in the Southeast.

Western Canada . . . The Westward Ho and Sundre Mississippian discoveries 60 miles north of Calgary were no doubt the most significant Mississippian strikes since Turner Valley for Alberta.

Mid-Continent . . . Highlights were: First Ellenburger oil in the Texas Panhandle, expansion of Beaver County's Pennsylvanian fields, the fast growth of West Short Junction field in Oklahoma, and Arbuckle discoveries in southern Oklahoma, and the 30-mile Eureka trend in northern Oklahoma.

Eastern Interior-Appalachian . . . Illinois and western Kentucky enjoyed their best discovery, development, and production year since the "boom days." The southern end of the basin was the focal point of the activity. Fracturing boosted Ohio's output while new deep Oriskany gas successes were noted in New York and Pennsylvania.



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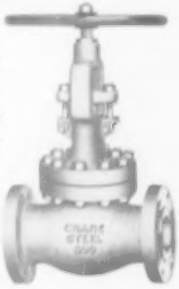

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Highlights of 1955's Important Discoveries

. . . Here's where the wildcatters hit pay dirt

South Texas

Drilling Increased, More Wells Opened Reserves

EXPLORATION in South Texas during 1955 not only resulted in many new oil and gas discoveries, adding materially to potential reserves of the region, but paved the way for more widespread exploratory efforts and development during the coming year. Wildcat drilling in the region as a whole increased, and with it a much greater percentage of tests drilled proved successful in finding additional petroleum reserves.

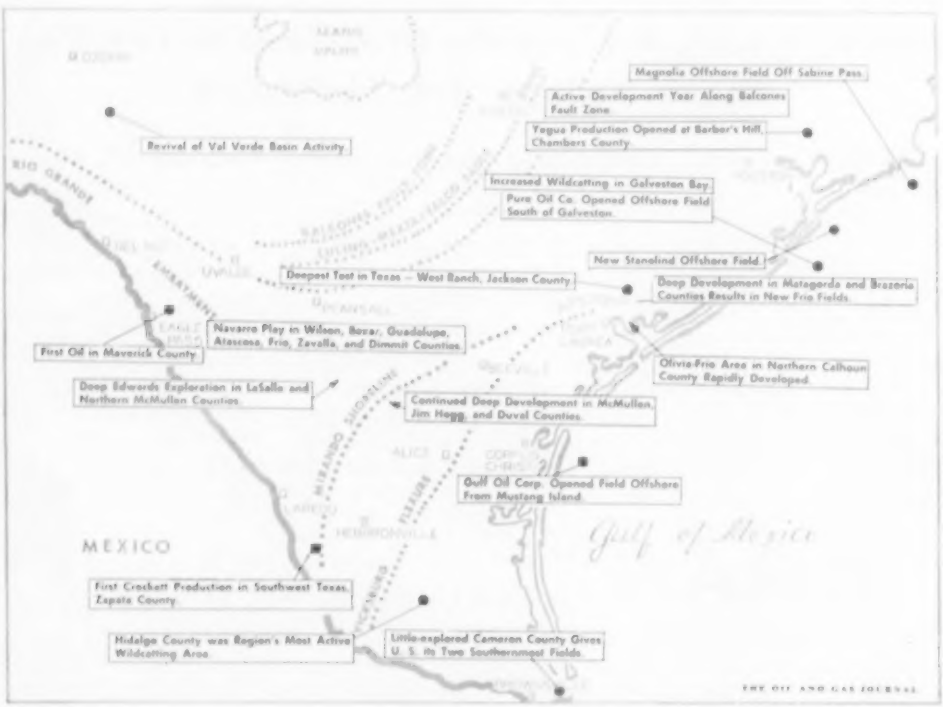
The upper coastal area's first commercial production in the Gulf of Mexico was opened during the year. The initial discovery by Magnolia Petroleum Co. last February 10 miles southwest of Sabine Pass in the High Island area, was followed in April by a Pure Oil Co. discovery 12 miles southeast of Galveston, and, in August, by another 15 miles east of Galveston by Stanolind Oil & Gas Co. Four gas-condensate wells, in as many sands, have been completed in Magnolia's field; two oil wells and one condensate well in three sands, in Pure's field; and two condensate wells, each in a different sand, in Stanolind's field.

In addition, Shell Oil Co. completed a gas well bottomed under the Gulf of Mexico 750 ft. offshore from Matagorda Peninsula, Matagorda County, in an extension discovery at its Kain field. This well was drilled directionally from a surface location onshore. Caplan on Bolivar Peninsula, Galveston County, is the only other field in the upper coastal area of Texas with production under the gulf. Wells there also are drilled from surface locations.

"Offshore" exploration in bay waters continued to prove attractive with additional fields being opened in Galveston and Matagorda bays, and in their respective arms, or secondary bays. Particularly active was the area around

Exploration Data

Upper Coastal Area, Railroad Commission Districts 2 and 3	
New oil fields (Includes condensate)	155
New gas fields	43
Total wildcats (Down 1.6 per cent)	663
Wildcat footage	3,399,283
Success ratio, per cent	23
Southwest Area, Railroad Commission Districts 1 and 4	
New oil fields (Includes condensate)	152
New gas fields	40
Total wildcats (Up 11 per cent)	982
Wildcat footage	4,453,059
Success ratio, per cent	19.5


Magnolia Offshore Field Off Sabine Pass
Active Development Year Along Balcones Fault Zone
Revival of Val Verde Basin Activity
Yegua Production Opened at Barber's Hill, Chambers County
Increased Wildcatting in Galveston Bay
Pure Oil Co. Opened Offshore Field South of Galveston
New Stanolind Offshore Field
Deepest Test in Texas — West Ranch, Jackson County
Deep Development in Matagorda and Brazoria Counties Results in New Frio Fields
Navarro Play in Wilson, Bexar, Guadalupe, Atascosa, Frio, Zavalla, and Dimmit Counties
First Oil in Maverick County
Olivia-Frio Area in Northern Calhoun County Rapidly Developed
Deep Edwards Exploration in LaSalle and Northern McMullen Counties
Continued Deep Development in McMullen, Jim Hogg, and Duval Counties
Gulf Oil Corp. Opened Field Offshore From Mustang Island
MEXICO
Gulf of Mexico
First Crockett Production in Southwest Texas, Zapata County
Hidalgo County was Region's Most Active Wildcatting Area
Little-explored Cameron County Gives U. S. Its Two Southernmost Fields
THE OIL AND GAS JOURNAL

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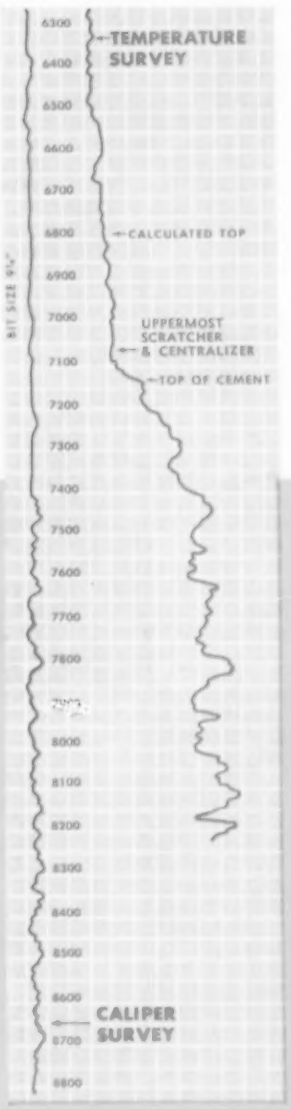

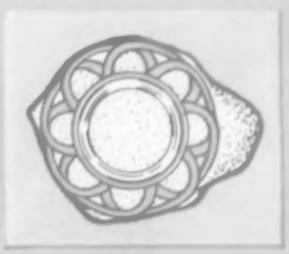

FAILURE!
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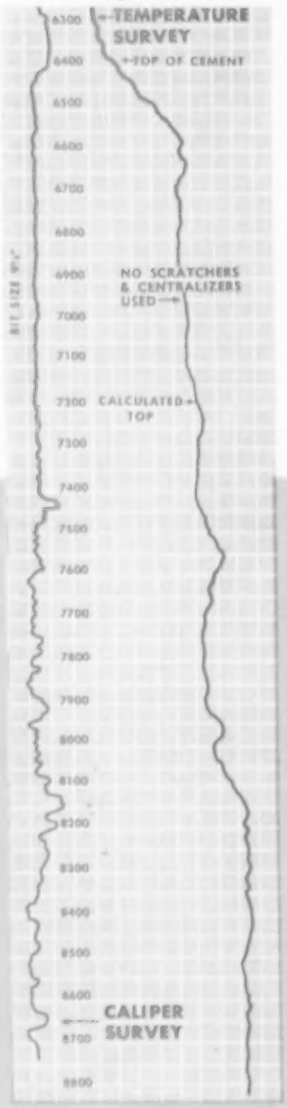

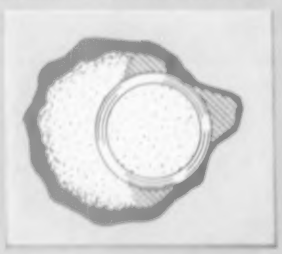

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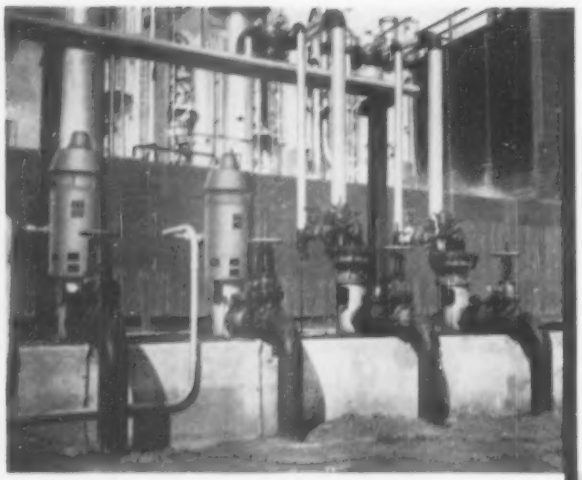

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. . . "First production at Davis Hill, one of oldest known salt domes on coast."

Smiths Point, on the Chambers County side of Galveston Bay, where at least three new producing reservoirs were found. Brazos Oil & Gas Co. uncovered a shallow gas field in Matagorda Bay, 5 miles offshore and about 10 miles south of Palacios, Matagorda County.

Northern Calhoun and southern Jackson County was a scene of exploratory and development activity occasioned by and resulting in a succession of new-field discoveries. Focal point was the Olivia area, bordering and stretching across Keller's Bay (upper extremity of Matagorda Bay), where a multiple-reservoir field was being developed in Frio sands below 7,500 ft. Active development also was under way at Appling, a few miles to the east along the Calhoun - Jackson county line, where important new oil and gas-condensate production was uncovered and 14 wells completed, and also in the new, companion Maude Traylor area, about 2 miles west of Olivia. Within a 10-mile radius, embracing the Olivia-Point Comfort-Port Lavaca area, at least a half dozen new fields, productive from Frio sands ranging in depth from 6,000 to below 9,000 ft., have been opened within the past year.

Offshore Field Shows Promise

In San Antonio Bay (branch of Matagorda Bay), 2 miles offshore from Seadrift, in southern Calhoun County, another promising field (North San Antonio Bay), productive of gas-condensate from a 7,800-ft. Frio sand, and oil from a 7,700-ft. zone in the same horizon, was discovered.

Up the coast, additional important oil and gas-condensate discoveries continued to be made in Matagorda, Brazoria, Galveston, Chambers, and Jefferson counties. These were in the form of both new fields and new reservoirs in and around existing productive areas, despite intensive exploration these counties have experienced over many years. Characteristic of exploration and development in these counties, most of the discoveries were in deep Frio-Vicksburg sands.

The more inland Eocene belt also accounted for a long list of new discoveries in Cockfield, Yegua, Cook Mountain, and Wilcox sands. Colorado, Fort Bend, northern Harris, southern Montgomery, northern Liberty, and Hardin counties figured conspicuously in these. Northern Harris County was particularly active, the most extensive local development being in new Rotherwood field, west of Spring, 25 miles north of Houston, where 10 wells have been completed in a 5,800-ft. Cockfield sand.

Eocene production was extended coastward to the old Barbers Hill salt dome with a deep Yegua-sand discovery in a new sector on the north flank of the dome. The initial discovery in a sand at 10,700 ft. has been followed with the opening of a deeper reservoir below 11,000 ft.

Among the more significant developments of the year was the discovery of first production at Davis Hill, in northern Liberty County. Davis Hill, one of the oldest known salt domes on the Texas Coast, has been drilled on and around spasmodically more than 50 years without yielding more than teaser showings. Its oil discovery offers further support to the long-held belief every salt dome, no matter how extensively drilled, eventually will be found productive. Production at Davis Hill, a shallow, piercement-type dome, was found in a 6,700-ft. flanking sand on the northeast side.

In the center of its large West Ranch field, south of Vanderbilt, in Jackson County, Magnolia Petroleum Co. drilled an exploratory test to a total depth of 19,060 ft., setting a new drilling-depth record, not only for South Texas, but also for the entire southwestern region of the country outside of South Louisiana and Mississippi. Bottom of the hole was in Jackson shale when further drilling was prevented by an unsuccessful fishing job. Since then, the well, with hole plugged back, has been completed in two of the field's main producing sands about 5,100 ft.

Navarro-Olmos Play Important

In South Texas' southwestern region, comprising Railroad Commission Districts 1 and 2, the Navarro-Olmos play extending across Atascosa County into Bexar and Wilson counties, on the north and east, and southwestward through into Frio County, overshadowed all other activity. Not only were many new producing areas uncovered, but development in several of these resulted in extensive drilling activity.

Notable, was East Crown field, discovered late in 1954, where nearly 150 wells were completed during the year with pay zones at depths of 4,000 to 4,400 ft. Productive area of this field in northwestern Atascosa County spread westward into Frio County where it connected with the widespread Big Foot field, actively developed in previous years. Its extension in other directions engulfed several smaller producing areas.

Additional Navarro exploration was carried on in northwestern Dimmit, far southwestward along the trend, where a group of small fields have been found over several years in the Carrizo Springs area. Most important of these so far has been Wintergarden field.

On the Pearsall anticline, along the trend in Frio County, exploration and development of Austin chalk potentialities continued fairly active. Austin chalk also was a particular objective in important new exploration and development northeastward along the Balcones fault belt through Guadalupe and Caldwell counties.

Largest concentration of activity there was in the old Luling-Branyon area, which accounted for a long list of successful completions and a substantial increase in reserves.

Edwards Plateau Attracts

Growing interest was manifest in oil and gas potentialities of the meagerly prospected far-southwestern counties on the Edwards plateau, the upper reaches of the Rio Grande embayment, and Val Verde basin. This was inspired by discoveries in Maverick and Val Verde counties. Maverick County got its first and so far only oil production, a well completed by Continental Oil Co. in Eagleford formation, at 3,127-4,134 ft. Two additional tests, both offsetting the discovery, failed, one being drilled to 7,540 ft. Their location, on the Chittim anticline, 18 miles east of Eagle Pass, is about 15 miles south of the old Chittim Ranch gas area, the county's only other production.

Val Verde County came into the picture again with a major extension discovery in the Vinegarone gas area in the northeastern corner of the county. The extension discovery well, several miles southwest of the original production, was completed early in the year by Phillips Petroleum Co. with gas-condensate production from the area's 10,000-ft. Pennsylvanian-Strawn sand. Since then, Humble Oil & Refining Co. has completed another extension well in the same area.

Previously, the county's only other production has been in the old Wardlow area, 15 miles southeast on the Edwards county line, where a few small wells have been completed in a shallow (300-ft.) Trinity sand.

A shallow oil area is indicated in the extreme southern part of the county, east of Del Rio, where Karl Hoblitzelle, of Dallas, has been testing indicated production in upper Edwards lime, perforated in two intervals from 760 to 800 ft. The well produced at the rate of 10 bbl. of 36.°-gravity oil

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per hour in first tests. Since then it has been put on the pump for additional tests.

The area's lower coastal and Rio Grande Valley region continued a happy hunting ground for additional oil and gas reserves, with another long list of discoveries being recorded, both in new fields and in extensions and new reservoirs in existing fields. Hidalgo, Duval, and Starr counties probably accounted for most of the activity, although exploration spread over the entire area.

Exploration in the Gulf of Mexico resulted in a deep gas discovery early in the year by Gulf Oil Corp. The discovery well, located several miles off Mustang Island, Nueces County, preceded discoveries made off the upper Texas coast. Productive from a 11,450-ft. sand, it has been shut in since completion, and no additional wells have been drilled in the immediate area.

Standard Oil Co. of Texas continued steady development of its Chevron field, the Texas coast's first offshore field, located off the coast of Kleberg County's Padre Island. The field, a 1954 discovery, now has five wells with oil and gas production from multiple reservoirs in Frio sands.

Exploration Summaries

Exploration Data	
West Texas	
New oil fields	163
New gas fields	12
Total wildcats	840
(Down 10 per cent)	
Total exploratory footage	4,914,272
Success ratio, per cent	20
New Mexico	
New oil fields	33
New gas fields	0
Total wildcats	110
(Up 22 per cent)	
Wildcat footage	682,766
Success ratio, per cent	30

West Texas-New Mexico

Devonian Finds Came Regularly

WEST Texas' and Southeast New Mexico's 1955 successful exploration was dominated by Devonian discoveries. These came in with regularity throughout the year. They were found in and near old producing areas, and also in rank wildcat territory.

The deep-drilling trend provided steady work during 1955 for heavy-duty rigs. New pools opened in the Wolfcamp, Pennsylvanian, and Silurian formations added to the over-all demand for equipment for drilling to 9,000 ft. or deeper.

Wildcat oil finders and development drillers were especially successful along the Texas-New Mexico border in a 15-mile-wide belt running north from Hobbs, through Knowles, Caudill, Denton, Bronco, and to a wildcat in southwestern Cochran County, Texas, which at year's end had made a heavy flow of oil on its initial test of the Devonian.

Clear Fork in the Spraberry patch . . . In spite of an over-all good year for drilling in the Permian basin area of West Texas and Southeast New Mexico, drilling contractors reported many slack periods for rigs in the 6,000-ft. class. The rapid spread of Clear Fork recompletions in the Spraberry Trend fields brought up the possibility of a new drilling play in this vast area.

Many reworked wells had excellent potentials from the Clear Fork, and there was some talk that a drilling program might be started with the Clear Fork as the objective. This drilling would have been done within the Spraberry fields which had been put down on 160-acre spacing.

By year's end this drilling play had not materialized. Clear Fork pay was holding up to most expectations, that of making the original well investment pay out. But all the equipment involved for recompletion was a workover rig.

Central Basin platform . . . Queen sand and other shallow pays provided several small drilling "plays" during 1955. In Texas many new Permian pools were opened along the Central Basin

600-Bbl. Devonian Opener, East of Cross Roads
Medium-Depth Drilling Play at Frontier Field
1950-Bbl. Wolfcamp Discovery
Caudill-Devonian Development Included Producing Depth Record in New Mexico
2,254-BOPD Devonian Strike, 125-ft. Section
Mississippian Discovery, High Flowing Potential
523-Bbl. Ellenburger Discovery, 3 Miles West of Pennsylvanian Reef Wells, Scurry County
Queen Sand Discoveries, Rapid Drilling Linked Series of Fields From Capirock to S. Dickey
Seagraves Devonian Discovery, 600-Bbl. Potential
Extensive Devonian Drilling in Russell Field, Potentials to 1,500-Bbl.
1000 BOPD Devonian Discoveries
Bone Spring Oil Discovery, May Have Bearing On Northern Limits Of Delaware Basin
Humble's Queen Sand Discovery in Means Field, Spurred Drilling Here and Other Areas
Queen Sand Discovery, Wolfcamp Development, Boosted Nolley Field Production
Bone Spring as New Pay at Bell Lake Extension
Devonian Distillate Pay, Crosby Field
Barrow-Ellenburger Trend Discovery on NW. New Strawn, Bend Pays, Dual Wells, Spread Headline, Dora Roberts, Vivey, Warson Fields
Development and Extension Drilling in Mason Field Area
Ellenburger Strike
Ellenburger, Devonian Pays Added to Tubb, Gloriata
Permian, Pennsylvanian, Devonian, Silurian and Ordovician Pays Opened in Waddell Field, Dual Wells Had High Potentials
Good Delaware Sand Production Opened in Ward County
Three Devonian Geysers Completed at Tayah
Spraberry Drilling Continued, Added This Area to "Trend"
Continued Development of High-Potential Gas-Distillate Devonian Wells in Payton Field
King Mountain-Ellenburger Discovery, 4 Wells at Year's End, New Pays Showing
Strawn Extensions West of World Field
Puckett-Ellenburger Gas Reserves Increased by Extension Drilling, Plus Discovery of High Ellenburger Relief on Field's Northern and Eastern sides
Ellenburger Discovery of Buckhorn Field, Eastern Crockett County
Sheffield-Ellenburger Discovery, Two Wells at Year's End
Cambrian Sand, Strawn and Odom Sections Ellenburger Discoveries, Marked a Good Year for Nolan County
Jameson Field Drilling Greatly Expanded West Side, Opened New Areas in Bordering Sterling County
Clear Fork (Wichaven) in Spraberry Trend Discovery Near Four-Corners, Recompletions Have Spread Over Wide Area
Many Strawn, Cisco Fields Opened in Northern and Southern Fort Green County
Ellenburger and Fusselman Discovery
Seven Wildcatting Opened 5 Fields, Two Were Good Clear Fork Flowing Wells

platform areas from Crane to Andrews counties. Western Ward County experienced a wave of activity in the Delaware sand drilling.

In Southeast New Mexico, old areas came in for new shallow drilling, along the southern portion of the Artesia-Vacuum trend, and Queen sand added a series of new fields trending 20 miles southwest from Caprock field.

Midland basin . . . In this area, big Devonian wells were opened in Dawson, Gaines, and in northern Martin County. The Pennsylvanian sands and limestones also came in for their fair share of new pool discoveries. The so-called Horseshoe Atoll reef fields were in the news with a promising discovery on the northwestern tip of the atoll, north of the Ropes-Pennsylvanian fields in eastern Hockley County.

On the eastern side of the basin, Howard County activity picked up during the latter part of the year with the completion of a big Fusselman well southeast of similar production in the Luther fields, and a Pennsylvanian reef discovery due east of Luther. A flurry of Permian fields were opened in Howard County, west of Big Spring.

Delaware basin . . . Several shallow Delaware sand pools were opened in Loving, Ward, and Winkler counties, on the Texas side. In the New Mexico portion, deep gas pay, and a new oil pay in the Bone Spring formation were added to San Simon (Bell Lake) field.

Eastern platform . . . Many new fields were opened from Schleicher County, northward through Tom Green, Coke and Runnels, Nolan, Fisher, and Stonewall counties.

Runnels County operators had a field day throughout the year in the many Pennsylvanian pays, such as the Gardner sand, Goens, and Odom limestones.

Nolan County gained new fields over the entire county, mostly in the Strawn and Ellenburger. Dora and North Dora fields had several high-potential Strawn and Cambrian wells, some of which were dual completions. North Dora-Cambrian field gained a long west extension. Strawn drilling was heavy in southwestern Nolan County, and some wells had flowing potentials up to 500 bbl. a day.

Ark-La-Tex

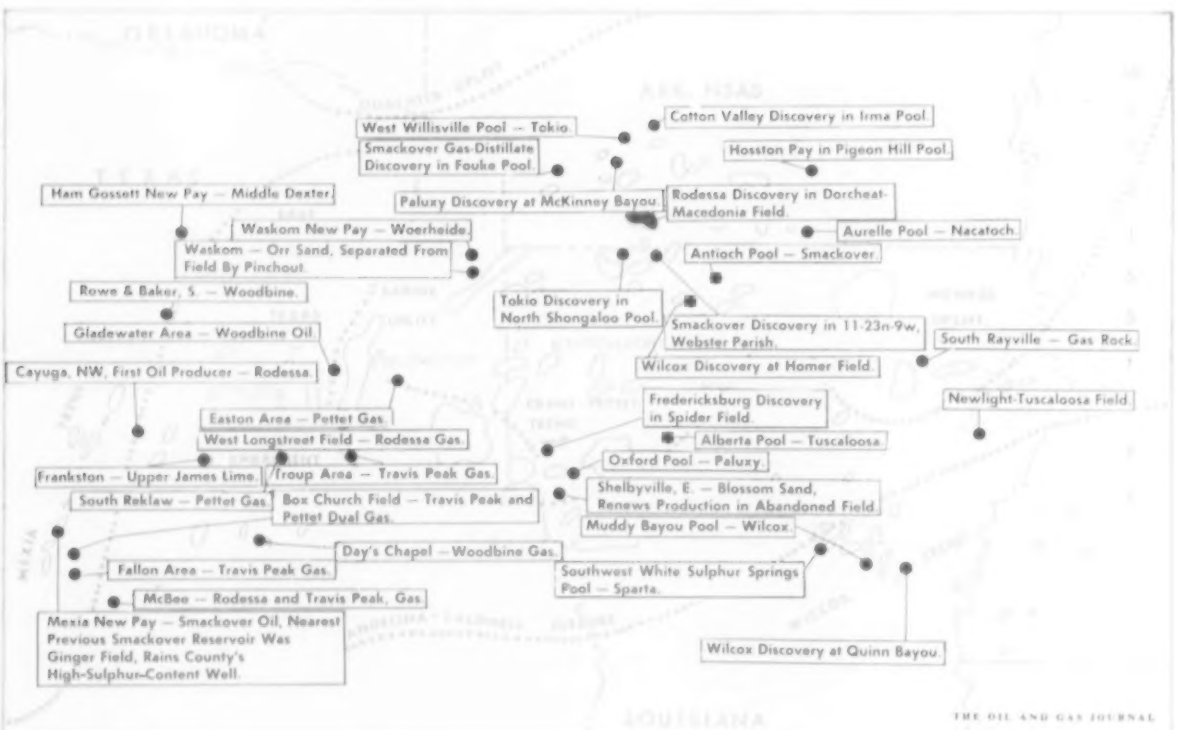
Pettet Figures in Major Regional Plays

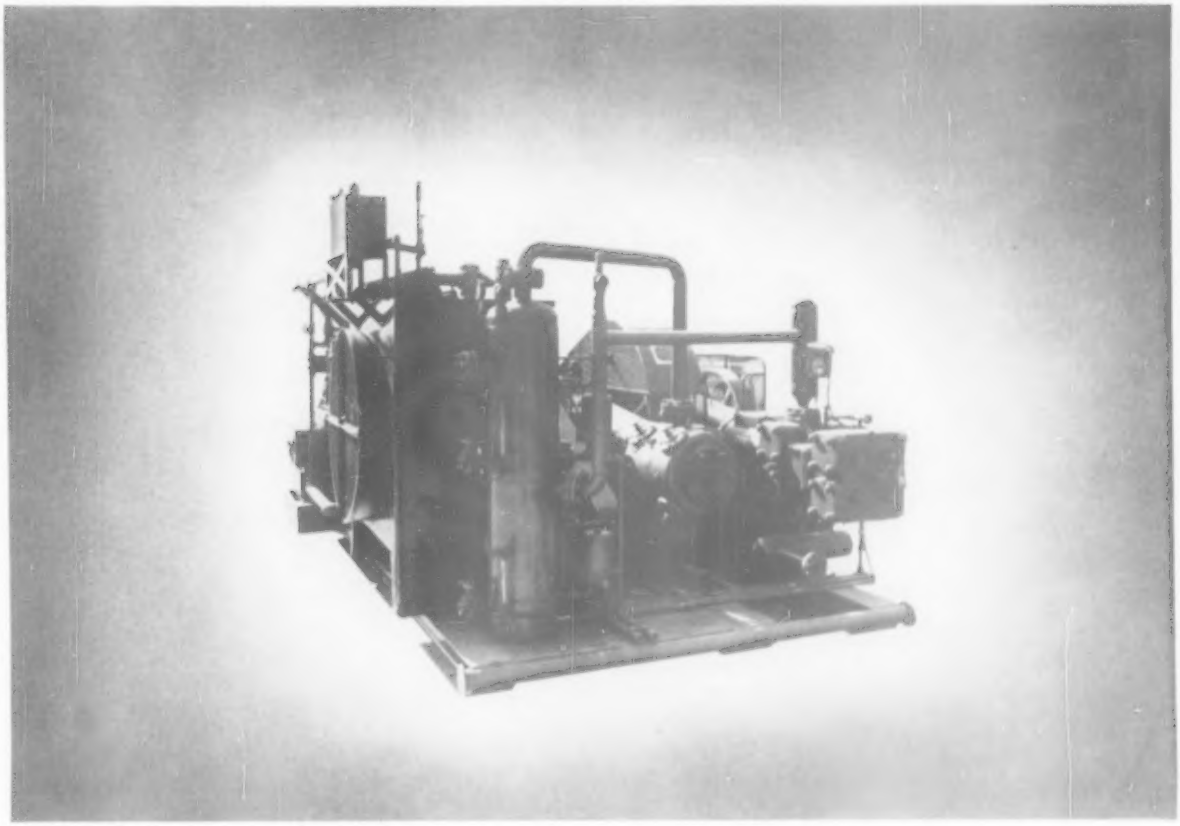
OIL hunters in the Ark-La-Tex region probed the Jurassic and Lower Cretaceous formations of Arkansas, North Louisiana, and East Texas with considerable success, particularly in northwestern Louisiana and East Texas. The Smackover and Cotton Valley formations of Jurassic age paid off rather handsomely in scattered areas of the province. One of the major oil and gas plays in the region was the fast-growing Pettet trend in the Carthage, Waskom, and Logansport area.

The Regional Story

Arkansas . . . Most of this state's exploratory success last year was confined to new pays and extensions in older producing areas. Development drilling continued at a steady pace with previous years. There was some gas exploration in the Arkansas River Valley basin. Near the end of the year a pickup in new locations in the western part of the state, particularly near the Oklahoma line, promised some shallow wildcatting in search for gas in the coming months.

North Louisiana . . . The search for Cotton Valley, Smackover, and Pettet production in this region moved along at a fairly fast clip. The year's first discovery was at Carter Oil Co. 1 Smith in Bossier Parish. This Smack-


OKLAHOMA
ARK.-TEX.
LOUISIANA
West Willisville Pool — Tokio.
Smackover Gas-Distillate Discovery in Fouke Pool.
Cotton Valley Discovery in Irma Pool.
Hosston Pay in Pigeon Hill Pool.
Ham Gossett New Pay — Middle Dexter.
Paluxy Discovery at McKinney Bayou.
Rodessa Discovery in Dorcheat-Macedonia Field.
Waskom New Pay — Woerheide.
Waskom — Orr Sand, Separated From Field By Pinchout.
Aurelle Pool — Nacatoch.
Antioch Pool — Smackover.
Rowe & Baker, S. — Woodbine.
Tokio Discovery in North Shongaloo Pool.
Gladewater Area — Woodbine Oil.
Smackover Discovery in 11-23n-9w, Webster Parish.
South Rayville — Gas Rock.
Cayuga, NW, First Oil Producer — Rodessa.
Wilcox Discovery at Homer Field.
Fredericksburg Discovery in Spider Field.
Newlight-Tuscaloosa Field.
Easton Area — Pettet Gas.
West Longstreet Field — Rodessa Gas.
Alberta Pool — Tuscaloosa.
Frankston — Upper James Lime.
Troup Area — Travis Peak Gas.
Oxford Pool — Paluxy.
South Reklaw — Pettet Gas.
Box Church Field — Travis Peak and Pettet Dual Gas.
Shelbyville, E. — Blossom Sand, Renews Production in Abandoned Field.
Muddy Bayou Pool — Wilcox.
Day's Chapel — Woodbine Gas.
Fallon Area — Travis Peak Gas.
Southwest White Sulphur Springs Pool — Sparta.
McBee — Rodessa and Travis Peak, Gas.
Mexia New Pay — Smackover Oil, Nearest Previous Smackover Reservoir Was Ginger Field, Rains County's High-Sulphur-Content Well.
Wilcox Discovery at Quinn Bayou.
THE OIL AND GAS JOURNAL



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Exploration Summaries

Exploration Data	
Arkansas	
New oil fields	36
New gas fields	4
Total wildcats	210
(Up 33 per cent)	
Wildcat footage	775,769
Success ratio, per cent	19
North Louisiana	
New oil fields	34
New gas fields	8
Total wildcats	242
(Up 13 per cent)	
Wildcat footage	1,340,238
Success ratio, per cent	17
East Texas	
New oil fields	30
New gas fields	11
Total wildcats	367
(Up 9 per cent)	
Wildcat footage	1,882,914
Success ratio, per cent	11

over "A" discovery opened Arkan field. Other active Smackover discovery areas were: Colquitt in Claiborne Parish, Red Rock in Webster (the district's deepest production is here at 10,915 ft.).

An important Cotton Valley discovery was made at Cadeville on the Monroe uplift in Northeast Louisiana's Ouachita Parish. There was considerable Travis Peak exploration in North Louisiana during the year. The Wilcox play in East-Central Louisiana was rather quiet.

The most important development work in the region was the continued expansion of the Crane-Pettet trend in southern Caddo and northwestern DeSoto parishes. This expansion is connected to a similar play in East Texas that saw the linking up of Bethany, Elysian Fields, and Waskom. The Pettet production now extends southeastward into the Longstreet area of DeSoto Parish.

East Texas . . . Smackover and Cotton Valley exploration plus the Pettet play featured the wildcat story in this sector of the province.

The most significant discovery of the year in East Texas was perhaps the Smackover strike at Mexia. A busy wildcat drilling program was in evidence up and down the Mexia fault zone, promising extension of this work in 1956.

Woodbine production was opened beyond the western boundary of big East Texas field in Gregg County. Cotton Valley drilling extended production from this formation up the east side of Bethany field. There was considerable drilling for Pettet oil in the Bethany and Waskom areas.

Mid-Continent

Oklahoma Scores in 70 of 77 Counties

EXPLORATORY success in Oklahoma in 1955 extended from the Kansas border to the Red River. All sections of the state were busy, particularly the Panhandle, the northern tier of counties, and southern and south-central areas. There were wildcats drilled in 70 of the 77 counties in the state. Although the number of wildcats drilled was lower than the previous year, discoveries in the state were of better caliber than in recent years, especially in the southern portion. A late-year increase in wildcat activity, enhanced by an impressive list of new discoveries, promises a long period of continued high interest throughout the state.

The Regional Story

The biggest exploratory news in Oklahoma came from the southern portion of the state . . . the Ardmore and Marietta basins, the north side of the Arbuckle Mountains, and up on the northern shelf of the Anadarko basin.

The south . . . Nominee for the discovery of the year goes to Frankfort Oil Co.'s 2 Williams in 12-5s-2w, Carter County.

Exploration Data	
Oklahoma	
New oil fields	98
New gas fields	23
New pays and extensions	64
Total wildcats	832
(Down 3 per cent)	
Wildcat footage	3,515,175
Success ratio, per cent	22
North Texas	
New oil fields	217
New gas fields	23
New pays and extensions	64
Total wildcats	832
(Down 13 per cent)	
Wildcat footage	3,674,050
Success ratio, per cent	23
Kansas (Incl. Southwest)	
New oil fields	90
New gas fields	32
Total wildcats	1,018
(Up 26 per cent)	
Wildcat footage	4,053,837
Success ratio, per cent	16

Recovery of nearly 5,000 ft. of oil on test of the Arbuckle-Cambro-Ordovician commanded another look at the formation's southern Oklahoma possibilities. Subsequent Arbuckle discoveries in the Davis area of Murray County and at Cumberland field in Bryan County boosted the formation's promise of becoming a major oil reservoir in the complex southern Oklahoma province. Few if any wells have ever drilled a complete section of the 6,000-ft.-thick formation. One of the best strikes of the year was Frankfort 1 Gardner in 34-6s-2e, in Love County's Greenville area. The well flowed 35 bbl. of oil per hour from the Joins dolomite-Ordovician.

. . . The Viola-Ordovician. A Viola lime reservoir parallel to the south side of the Lone Grove, Brock, Healdton, and North Marietta area in Carter and Love counties was established during the year. Wildcat success along this trend stretched it to 30 miles in length. Maximum development of the Viola trend is expected to yield recoveries of at least 1 million barrels of oil per well in 40-acre spacing. The Viola lime wells are being completed on pump following initial high flows after fracture treatment. Viola production is closely related to a complex fracture system within the formation. The size of this reservoir emphasizes the importance of fractured limestone as a new source of oil.

And the north . . . An extensive east-west trend of more than 15 miles of basal Pennsylvanian sand oil and gas-distillate production was established just south of the Kansas line. This trend runs westward from Grant County's Eureka district into Alfalfa County. The spark that set off this big play was a Viersen-Cochran discovery in the west part of 28n-8w, Eureka area, Grant County. Calvert Drilling Co. and Woods Petroleum Co. later moved the development into the east part of 28n-8w. Further success by Continental Oil Co. and others stretched the basal Pennsylvanian producing area into Alfalfa County.

The pay zone is at the 4,800-ft. level. These sands in this area will likely yield several good shallow pools. Sand thickness ranges from 10-30 ft.

. . . Harper and Wood revival. Sun Oil Co. revived exploratory interest in northwestern Oklahoma's Harper County with gas success at 1 Holmes. This Morrow sand discovery stirred interest in the Buffalo area just east of the Oklahoma Panhandle.

One of the most significant discoveries of the year was Amerada Petroleum Corp.'s 1 Farris in southeastern Woods County. The northern shelf of the Anadarko basin has been quiet since the opening of Yellowstone field 3 years ago. The 1 Farris flowed 285 bbl. of oil daily from the Simpson sand to re-

kindle an expected Simpson play on the shelf. Northwest in Comanche County, Kansas, another Simpson gas discovery further emphasized the importance of the Farris discovery.

Late in the year there were 27 active geophysical crews in Oklahoma. Centers of geophysical prospecting were along the northern shelf of the Anadarko basin, the Ardmore and Marietta basins, and in other scattered central state areas.

Field Development

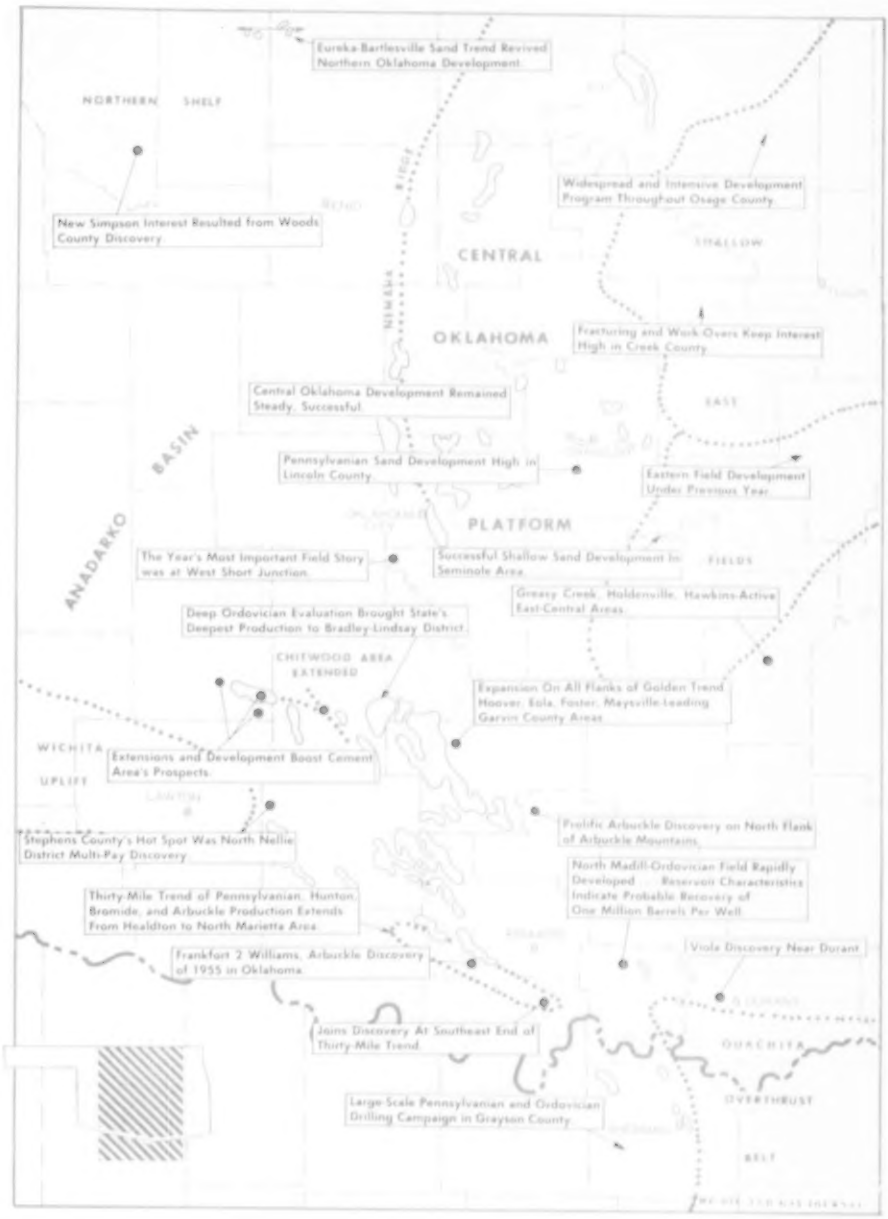
Two fields in the state shared the spotlight in development . . . West Short Junction in Cleveland, and prolific North Madill field in Marshall County. Neither of the fields was opened in 1955, however.

More than 50 Hunton lime wells were completed at West Short Junction last year. Many of this Siluro-Devonian field's wells flowed more than 1,000 bbl. per day.

North Madill - Ordovician field was expanded with great success. Extension wells moved the field limits both northwest and southeast. Recovery of 1 million barrels of oil per well from the many Ordovician pays is expected.

What's Next?

Oklahoma's wildcat success in 1955 opened some new avenues for future exploratory work. The Arbuckle play in southern Oklahoma should grow in importance and intensity this year. The Ardmore and Marietta basins will play major roles in the 1956 exploratory campaign. The revival of Northwest Oklahoma's hopes will bring new drilling programs to Harper and Woods counties. Look for an intensified Simpson sand oil and gas search on the northern shelf of the Anadarko basin, both in Oklahoma and Kansas. Keep an eye on the important new Cherokee Wedge region just south of the Kansas line in Alfalfa and Grant counties. This lower Pennsylvanian oil and gas-distillate reservoir may cover 35,000 acres, most of which is yet untouched.


Eureka-Bartlesville Sand Trend Revived Northern Oklahoma Development
NORTHERN SHELF
New Simpson Interest Resulted from Woods County Discovery
Widespread and Intensive Development Program Throughout Osage County
CENTRAL
OKLAHOMA
PLATFORM
Fracturing and Work-Overs Keep Interest High in Creek County
Central Oklahoma Development Remained Steady, Successful
Pennsylvanian Sand Development High in Lincoln County
Eastern Field Development Under Previous Year
ANADARKO BASIN
The Year's Most Important Field Story was at West Short Junction
Successful Shallow Sand Development in Seminole Area
Greasy Creek, Holdenville, Hawkins Active East-Central Areas
Deep Ordovician Evaluation Brought State's Deepest Production to Bradley-Lindsay District
CHITWOOD AREA EXTENDED
Expansion On All Flanks of Golden Trend Hoover, Eola, Foster, Maysville-Leading Garvin County Areas
WICHITA UPLIFT
Extensions and Development Boost Cement Area's Prospects
Stephens County's Hot Spot Was North Nellie District Multi-Pay Discovery
Prolific Arbuckle Discovery on North Flank of Arbuckle Mountains
North Madill-Ordovician Field Rapidly Developed . . . Reservoir Characteristics Indicate Probable Recovery of One Million Barrels Per Well
Thirty-Mile Trend of Pennsylvanian, Hunton, Bromide, and Arbuckle Production Extends From Healdton to North Marietta Area
Frankfort 2 Williams, Arbuckle Discovery of 1955 in Oklahoma
Viola Discovery Near Durant
Joins Discovery At Southeast End of Thirty-Mile Trend
OUACHITA
Large-Scale Pennsylvanian and Ordovician Drilling Campaign in Grayson County
OVERTHRUST BELT

Hugoton Embayment

Panhandles Were Wildcat Pacemakers

WILDCAT success and exploratory interest in the Hugoton embayment of the western Anadarko basin centered in Beaver County, Oklahoma Panhandle, and Ochiltree County, Texas Panhandle. Other important developments in the huge region were scattered from Gray County, Texas, to Kiowa County, Kansas.

The Regional Story

The exploratory pacemakers for the Hugoton embayment in 1955 were for the most part confined to the Oklahoma and Texas panhandles. Southeast and Southwest Beaver County dominated the Oklahoma Panhandle success scene, while Ochiltree and Gray counties in the Texas Panhandle came up with that region's most significant strikes.

Southeast Beaver . . . This section of the Oklahoma Panhandle was largely

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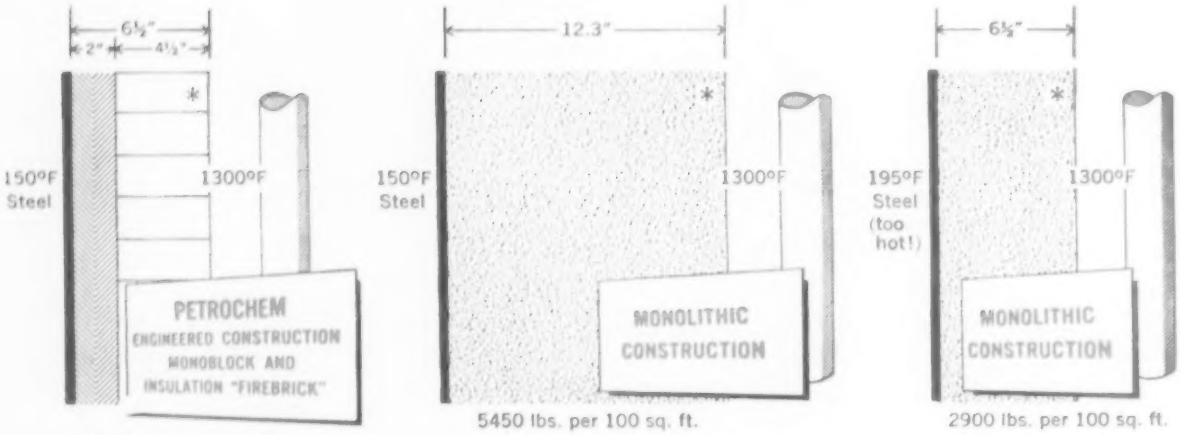

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"Most significant strike was Phillips' Ellenburger discovery in Gray County."

untested until last year. Union Oil Co. of California and Colorado Oil & Gas Co. opened the area to production at Elmwood and Madison fields, respectively. Both discoveries got Morrow-Pennsylvanian gas production . . . both strikes were considerable distances from previous production.

Southwest Beaver . . . The large unproductive area east of big Camrick field in this section of Beaver County received two new oil fields late in the year. Warren Petroleum Corp. opened East Camrick-Morrow field; Sunray Mid-Continent opened Southeast Gray-Morrow field.

Ochiltree County . . . Closely related to the Beaver County play was the sudden upsurge of activity and interest in the upper half of Ochiltree County, Texas. This section of the Panhandle had been relatively quiet until last year. Half a dozen oil and gas fields were opened during the year, most of them having Morrow sand production. This promising Texas county is located just south of the Beaver County area.

Ochiltree replaced Hansford County in exploratory interest in 1955. Most of Hansford County's drilling was concentrated on the development of the big Pennsylvanian reservoir there.

Exploration Data

Texas Panhandle	
New oil fields	8
New gas fields	7
Total wildcats	65
(Down 30 per cent)	
Wildcat footage	472,323
Success ratio, per cent	43
Oklahoma Panhandle	
New oil fields	8
New gas fields	13
Total wildcats	45
(Up 28 per cent)	
Wildcat footage	308,293
Success ratio, per cent	46
Southwest Kansas	
New oil fields	15
New gas fields	12
Total wildcats	92
(Up 8 per cent)	
Wildcat footage	468,028
Success ratio, per cent	29

Gray County . . . The most significant single strike in the entire embayment was perhaps Phillips Petroleum Co.'s Ellenburger discovery at Laketon-Delp field in Gray County.

Phillips' Delp strike opened first Ellenburger production in the entire Texas Panhandle. Nearest similar production is in Woods County, Oklahoma's Yellowstone-Arbuckle field, many miles to the northeast.

Quinduno field . . . This big field in Roberts County, Texas, got two new important producing zones in addition to its granite wash pays . . . the Douglas and Lansing of Pennsylvanian age.

Southwest Kansas . . . Exploration in this area of the embayment was scattered from Kiowa County on the east to Morton County on the southwest. Mississippian oil and gas discoveries highlighted the Kiowa County area. Basal Morrow interest continued high in the Greenwood South area of Morton County. Both wildcatting and development work throughout the state of Kansas were up considerably over the previous year.

Field Development

The outstanding field development story in the embayment was the continued growth of the Mocane area of Beaver County. This big producing area now has oil and gas-distillate production from the Virgil, Morrow, Missouri of Pennsylvanian age, and the Mississippian-Chester. The fastest-growing sector of the producing area is Northwest Mocane field.

What Now?

Four 1955 discovery areas in the Hugoton embayment will play major roles in the 1956 exploratory tale . . . Southeast and Southwest Beaver County, Ochiltree County, and a newcomer to the list will likely be Lipscomb County in the extreme northeast corner of the Texas Panhandle. Last year's key discoveries in the Beaver County areas and in Ochiltree County to the south have sparked keen interest in the region's future as an important Pennsylvanian oil and gas reservoir. More success in southeastern Beaver County will set off an expected wildcat push into Lipscomb County.

Pennsylvanian discoveries inside Hugoton-Permian gas field last year have opened the way for similar strikes this year, particularly in Texas County, Oklahoma, and in southwestern Kansas counties. Look for more ultradeep wildcatting north of the Amarillo Mountains in the deep portion of the western Anadarko basin this year. This region is full of surprises such as the Ellenburger discovery last year at Laketon-Delp. Indications are that the coming months will see increased activity in southeastern Colorado, and perhaps in Northeast New Mexico.

First Oil in Hamilton County
Kiowa County Mississippian Discoveries
First "Outside Hugoton" Permian Gas
Morrow Gas Discovery Inside Hugton
Morrow and Mississippian Expansion in Mocane Area
Revival of Harper County Activity
East Camrick and Southeast Gray Fields
Rank Southeast Beaver County Discoveries
New Interest Slated For Lipscomb County
Ochiltree Activity Dominated Panhandle Interest
North Hansford Gas – Distillate Play Subsided
First Production for Hemphill County
Douglas and Lansing – Kansas City Pays Added at Quinduno
Granite Wash Pays Added At Laketon
First Ellenburger Oil in Panhandle – The Region's Most Important Strike

California Drilled More Holes, But With Poor Success

MODOC LAVA PLATEAU
NORTHERN COAST RANGES
SIERRA NEVADA
SACRAMENTO VALLEY
SAN JOAQUIN VALLEY
CENTRAL COASTAL RANGES
EASTERN DESERT REGION
LOS ANGELES BASIN
SANTA MARIA BASIN
VENTURA BASIN
New Gas Field Discovery in Perkins Lake Area, Butte County
New Gas Pool Discovery 1½ miles South of Willows Gas Field, Glenn County.
New South Princeton Gas Field Discovery in Colusa County
New Oil Field Discovery in San Mateo County Opens New Territory for Exploration.
Southeast Vallecitos Field Discovery in San Benito County. Two Offsets Failed in Upper Eocene Pay.
Deeper Drilling on Flank of Guijarral Hills Field Opens Gatchell Sand (Eocene) and New Lower Miocene Pools in Fresno County.
Deeper Vedder Zone and Two New Stevens Zones Discovered in Strand Area, Kern County.
New Fault Block Discovery in the Arvin Area of the Mountain View Field, Kern County.
New Pool Discovery Extends Production ¾ mile Northeast in Wheeler Ridge Field, Kern County.
Canada Larga Field Pliocene Sand Discovery in Santa Clara Valley District of Ventura County
Saticoy Field Discovery, Midway Between Saticoy and Santa Paula in Ventura County, Could be Significant.
This 14,001-ft. Pool Discovery Well in West Montalvo Field, Ventura County, Typifies Success of Deep Drilling in This Area.
Production Extended in Sansinena Field.
Deeper Drilling in Active Seal Beach Field Made an Important New Pool Discovery.
Townlot Drilling Boom Touched Off at Huntington Beach by Discovery in Jones Sand.
Offshore Portion Now Under Development.

Exploration Data

California	
New oil fields	45
New gas fields	14
Total wildcats	530
(Down 7 per cent)	
Wildcat footage	3,033,542
Success ratio, per cent	11

CALIFORNIA operators drilled more hole in 1955 than in 1954, but the results were disappointing. As in the past several years, California wildcatting failed to make any substantial contribution to the state's reserves.

The success ratio of finds to number of holes drilled in exploration improved. The state's 529 wildcats discovered 10 new fields and 29 new pools in 1955. That is 1 discovery for every 14 tests. In 1954 the ratio was 1 for every 27 tests. But, the 10 new fields were adding only about 700 bbl. daily to the state's production at the year's close. Only two or three of these new finds are of consequence and several are probably noncommercial.

This same distressing trend is found in the production figures of the new pools discovered. The 29 pool finds of 1955 were producing only 15,000 bbl. daily at the end of the year. In 1954, seven fewer pool discoveries were yielding 25,000 bbl. daily at the close of that year.

Average depths of both wildcats and development wells continued to increase. The depth average of development wells increased from 4,600 ft. in '54 to 4,832 ft. in 1955. The average depth of wildcats gained from 4,840 ft. in 1954 to 5,734 ft. this last year. The number of tests completed below 15,000 ft. increased from 3 in 1954 to 14 in 1955. Wildcats accounted for 13 of these deep tests.

Gas Search . . . Total drilling for gas in the Sacramento Valley region of California was up in 1955, but exploration drilling in this activity was down. In 1954 wildcatting accounted for 80 tests, resulting in 2 fields and 7 pool discoveries. Last year, only 70 gas wildcats were drilled in this region for a total of 350,000 ft. These 70 tests resulted in 2 new fields, 3 new pools, and 3 extensions.

Top discoveries . . . The most interesting, but not the most productive, find in 1955 was Union Oil Co.'s new Oil Creek field discovery in the Santa Cruz Mountains of San Mateo County. This find in October opened a new province to exploration. Its reserve potential is still unknown. The discovery, 1

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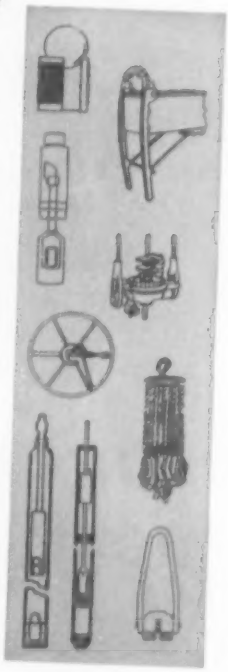

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U. S. Supreme Court

Union-Richfield-Costa, was completed in the Butano sands, Eocene age, producing from the perforated interval 2,044-2,206 ft. Initially the well was pumping 93 bbl. daily of 42.80-gravity crude through a 14/64-in. choke. The discovery is located on an anticlinal fold.

. . . **Saticoy,** discovered by Shell Oil Co., might later prove to be the most productive of the year. The field, located in the Santa Clara Valley of Ventura County, was discovered last May by 2 S. P. S. in the Pico formation, Pliocene age. Production from the perforated interval 7,525-40 ft. was 286 bbl. daily of 32.4°-gravity crude, flowing through 12/64-in. choke. The reservoir is reported to be sand and siltstone of average porosity and low permeability. The discovery is located NE SW 29-3n-21w, about 3 miles south of the town of Santa Paula.

. . . **Strand activity,** in Kern County, accounted for four discoveries, one of which was possibly the most important in San Joaquin Valley.

The big find in Strand field was Shell's Posuncula discovery in July. The operator completed 1 Posuncula flowing 1,084 bbl. daily of 33.5°- gravity crude through a 20/64-in choke. Production is from the Vedder zone in the Miocene. The perforated interval is 12,360-12,410 ft. This discovery gave the area its first Vedder production.

Shell also found the "73-X" pool with the 12,440-ft. 73-X Shell-Ohio-KCL in the main area of Strand field. The producing interval of this discovery is 9,500-9579 ft. Two other pools were discovered by Shell with 83 KCL in the East Strand field. These pools, first Stevens and "83," are in formations of Miocene age at 8,100 and 9,750 ft. respectively.

. . . **Huntington Beach** activity in Jones pool contributed a big share of wells to the state's total wells drilled. Found at the first of the year, the 3,700-4,000-ft. pool contained 200 wells at the end of the year. Except for one well, all were drilled in a townlot area of about 85 acres. Because of this dense drilling, a substantial portion of the oil reserve has already been produced. Production per well dropped from a high of 76 bbl. daily to the current rate of 20 bbl. daily.

Top event . . . Passage of the Cunningham-Shell bill by the state legislature is conceded to be the most important event in 1955. While passage of this act hasn't contributed a barrel of crude yet, its importance to the industry cannot be minimized. By this act, 135 of the 235-mile potential oil-rich tidelands in southern California were opened to exploration.

Full significance of this can be appreciated by a glance at a map showing the main crude-producing regions. Two of the state's biggest producing areas, Coastal and Los Angeles Basin regions, offset the tidelands.

Previous to passage of this act, operators could develop tidelands only where there was danger of drainage. And then only filled islands. Under the Cunningham-Shell statutes, offshore parcels are open to bonus bidding and the winning operator can develop the lease from onshore sites, artificial islands, or drilling platforms of the type used in the Gulf coast.

Two companies already have barges at work on stratigraphic and core drilling to obtain geological and structural data for use in evaluating offshore areas. Several other operators are pushing ahead construction of similar vessels. Little exploratory drilling and probably no development drilling will be done on tidelands leases in 1956. Best estimates now are that as much as 200 days will be required for processing applications for leases.

Onshore, the Santa Clara Valley region of the Coastal area appears to be the most promising. This Ventura County valley is already the scene of extensive development and deep exploration activity. Typical of the operations in this region are the 14,000-ft. Fillmore field, and the growth of Oxnard and West Montalvo fields nearer the coastline.

The state's producers expect to maintain production during 1956 at the current rate of 980,000 bbl. daily. In doing so, the role of secondary recovery will become increasingly important. Several operators are switching from pilot operations to major projects. Richfield Oil Corp.'s Russell Ranch project and Union and Shell's Dominguez field operations are typical of this trend.

Rocky Mountains

Another New Drilling Record Set

THE Rocky Mountain states had a new drilling record again in 1955. On a region-wide basis developments of 1955 set the stage for an even greater increase in 1956. New areas, important, but with little previous exploration became successfully active during the year. Older areas where activity has declined with lack of success had new encouragement. Area by area the 1956 outlook is good.

The Regional Story

In the Williston basin there was important development work in Montana and successful exploration in North Dakota.

Development work along the Cedar Creek anticline in eastern Montana was strong during the year, and contributed considerably to the best year the state has had in terms of wells completed. Development was based on outlet for crude through the now-completed Butte Pipeline running southward to junction with crude lines eastward in southern Wyoming.

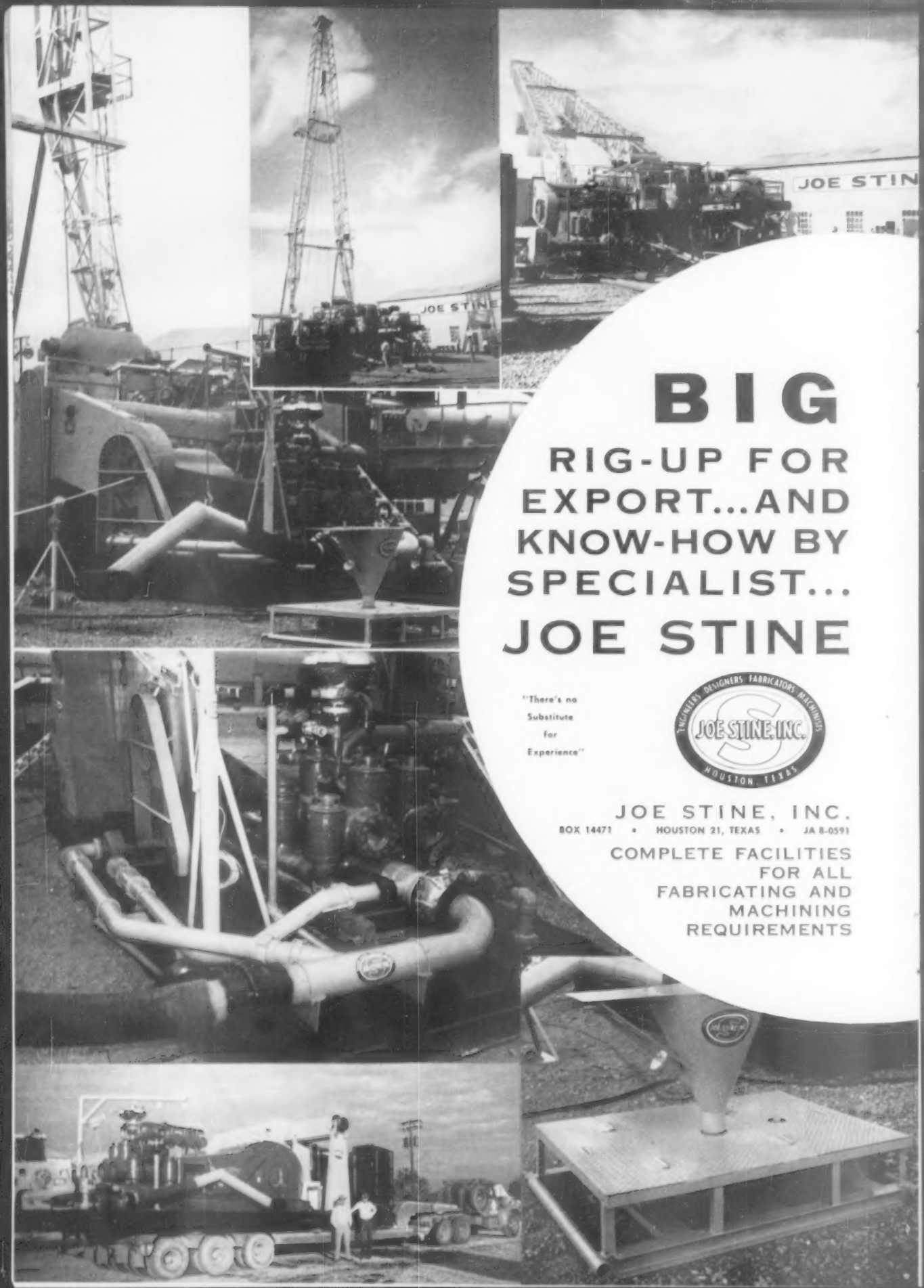
Discoveries were also made along the anticline, notably at Gas City and at Pennell. Development was in Pine, Cabin Creek, and East Poplar fields. Much development remains, and is now apparently economically feasible because of assurance of reasonable outlet.

A discovery late in the year in the Repeat area of Carter County, south and west of Cedar Creek anticline production, was considered one of the most important of Montana Williston basin developments. Ohio Oil Co. was still drilling at this well at year's end and after having recovered good amounts of oil on drill-stem test of Red River. Location is 19 miles south of Little Beaver and 22 miles west of production in northwestern South Dakota.

In North Dakota a discovery in Renville County by Sohio Petroleum Corp. offered the possibility that the important strike east of the Nesson anticline had been made. Decline of activity during the past 2 years in areas east of the anticline has been laid to lack of success except for the marginal Bottineau County developments. A good discovery was said to be all that was needed to break open exploration on a substantial scale in the area east of the anticline.

The Sohio Renville County success was reinforced by a small discovery to the southwest in Burke County. At the end of the year, Texota Oil Co. had an apparent discovery 25 miles north of Tioga and also in Burke County. In addition, Phillips Petroleum Co. and others were testing an indicated discovery in Divide County, west of other notable 1955 finds.

These assured and apparent successes, coupled with the large amount of acreage remaining under lease in North Dakota, some of which is approaching lease expiration, have put



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Exploration Summaries

East Bredette Confirmed – Was Year's First Strike in Williston
Mississippian Discoveries Set Pace In Southeastern Saskatchewan
Coteau – Burke County Discovery
Sohio 1 Ritter – Williston's Big 1955 Hit
Disturbed Belt Proved Disappointing
Six Shallow Strikes in Bottineau County
New Madison Fields
WILLISTON BASIN
Brorson – Ordovician Field Confirmed
New Ordovician – Red River Fields
Piper Discovery at Northwest Sumatra
Amsden Field Opened in Yellowstone County
POWDER
New Tensleep Discoveries
RIVER
Muddy Production Opened at Manderson
BASIN
No. 2 For South Dakota
GREEN
Busy Strat – Test Year for Chadron Arch
Gas Discovery at Grieve Unit
RIVER
Northernmost D-J Production Established
BASIN
Gas Extensions in Sublette County
New Dakota Pool
New Interest in Wyoming Portion of D-J
Second Pool For Cambridge Arch
Success High in Western Nebraska
Dakota Oil Discovery
DENVER-JULESBURG
First Oil at Thornburg
UINTA
BASIN
Second Permian Area in Basin
Large Gas Reserves Indicated in Grand County
Lakota Discovery
Southernmost Production Established in D-J
Easternmost Colorado Production
First Production in Delta County
Gas Search Picked Up on Western Slopes
Basin Production Moved to Southwesternmost Point
Interest Still High in Paradox
First Oil on Las Animas Arch
Coalbed Canyon Oil Discovery
SAN JUAN BASIN
San Juan's Deepest Well
First Oil in Arizona – Gas Production Confirmed
Gas Development On Increase in San Juan Basin

a different complexion on North Dakota possibilities. One of the important changes in 1956 should be a broadening of exploratory effort in this state.

In Montana, west of the Williston basin, an important Amsden discovery in the Wolf Springs area of Yellowstone County was confirmed at the end of the year, and the area is due for 1956 development. A 160-acre pattern which has been set at Wolf Springs will limit the number of completions to be expected from the area.

What appears to be a good Pryor (Lakota) discovery northwest of Clark's Fork in Carbon County was not complete at the end of 1955. This was regarded as one of the year's important developments.

Central and North Central Montana had strong wildcat programs during 1955, and showed no signs of slowdown in the current year.

In Wyoming the Clareton Trend on the east side of the Powder River basin slowed down during the year, and the state's statistics declined as a result. However, drilling in other areas was up. Development in the Big Horn basin, including a considerable amount of drilling to Muddy on the east side, was outstanding in the year's work.

Development in the Wind River basin and on the southwestern edge of the Powder River basin furnished further strength to Wyoming work.

The Green River basin in the southwestern corner of Wyoming had important discoveries, notably those on the Pinedale anticline in Sublette County, and the Hogsback area, also in Sublette County. Both were gas discoveries, in line with the trend of exploration in this basin, which is now getting new gas outlet via Pacific Northwest and Colorado Interstate systems.

Important exploration was scattered through this basin but the major exploratory program predicted by some for 1955 did not develop. It is expected to increase in 1956.

Southeastern Wyoming had discoveries in the Torrington area of Goshen County and in the Pine Bluffs area, Laramie County, for the first positive development in the Wyoming portion of the Denver-Julesburg basin in some years.

An expanded exploratory program is expected for this area in 1956. However, since production is somewhat deeper than in more active Denver-Julesburg areas, further discoveries of fair caliber will have to result before the drilling intensity of the Colorado or Nebraska portions of the basin results.

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Exploration Data

Colorado	
New oil fields	54
New gas fields	23
Total wildcats	811
(Up 23 per cent)	
Wildcat footage	4,333,015
Success ratio, per cent	9
Montana	
New oil fields	15
New gas fields	3
Total wildcats	172
(Up 39 per cent)	
Wildcat footage	802,896
Success ratio, per cent	10
Western Nebraska	
New oil fields	42
New gas fields	1
Total wildcats	388
(Up 109 per cent)	
Wildcat footage	2,111,957
Success ratio, per cent	11
Wyoming	
New oil fields	26
New gas fields	9
Total wildcats	262
(Down 3 per cent)	
Wildcat footage	1,351,169
Success ratio, per cent	13
Northwest New Mexico	
New oil fields	8
New gas fields	11
Total wildcats	48
(Down 27 per cent)	
Wildcat footage	193,771
Success ratio, per cent	39
Utah	
New oil fields	5
New gas fields	8
Total wildcats	71
(Up 9 per cent)	
Wildcat footage	307,816
Success ratio, per cent	18
North Dakota	
New oil fields	7
Wildcats drilled	69
Wildcat footage	384,016
Success ratio, per cent	10

In western Nebraska, the region's largest single activity again took place. Development by a variety of operators in the Harrisburg area of Banner County, intensive drilling in Kimball County, with expansion to west, and some renewal of Cheyenne County activity supported the Nebraska increase.

Toward the end of the year a discovery in Morrill County, and increased attention to Chadron arch prospects, much of it by operators new to the area, added to interest.

Late in December an apparent discovery was made in Garden County, 2 miles east of the town of Oshkosh. Pending completion, it is regarded as potentially the most important of 1955 discoveries in the basin, since it is 20 miles north and east of previous production, is the first success in the county, and may almost double the area of activity in western Nebraska.

In addition, an apparent discovery in Hitchcock County, on the Cam-

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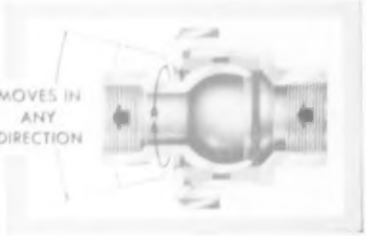

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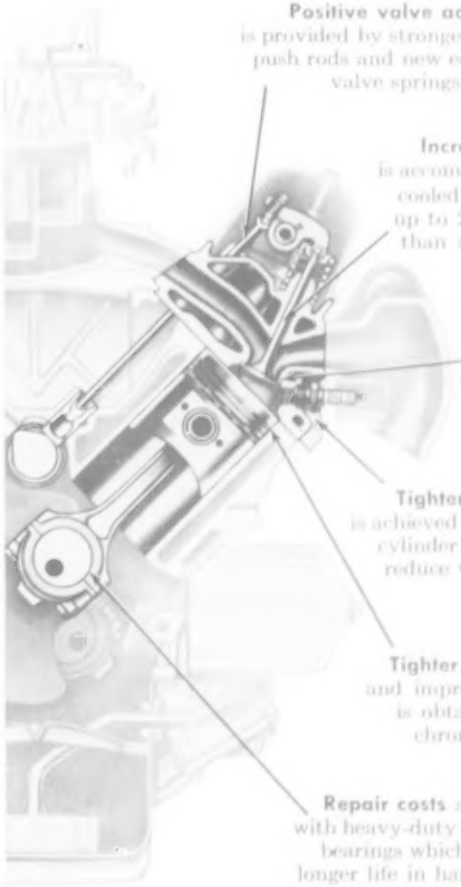

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bridge arch, still uncompleted at the end of the year, brought new interest in a new area of the state. Production is indicated from Pennsylvanian.

In Colorado, Denver-Julesburg basin drilling held up well during the year, accounting for a major portion of the state's total of 1,539 wells. Important developments in this part of the basin included Cliff field, Logan County, which grew to one of the basin's major producers before the end of 1955.

Two new pre-Cretaceous discoveries were made during the year. One was in old Fort Collins field, the other northeast of Black Hollow in Weld County. Both will considerably encourage deeper drilling in the basin.

Discovery at Black Hollow was made in 1953, and was the first substantial production from the Lyons (Permian) sand in the basin. A sizable flurry of drilling followed. It was not marked by success and died. Revival of deeper interest would materially assist Denver-Julesburg basin activity.

Drilling in Morgan County, on both sides of the Adena field met with some success during the year. The area was one of the more active in the Colorado portion of the basin. This distinction was shared by Washington County areas east of Little Beaver field. These areas contributed a good portion of the 72 discoveries made in Colorado.

The Las Animas arch at the southern end of the basin was much in evidence during the year, with a Pennsylvanian discovery completed in Bent County. Further drilling has not been extensive enough to give full evaluation of this discovery, but has resulted in some encouragement. Following the test of the Bent County well a good-sized leasing program developed along the arch.

Southern Colorado shared in the rise of activity in the San Juan basin. Development of reserves committed to the Pacific Northwest Pipeline and to El Paso Natural Gas Co.'s expansion program has hiked drilling in the San Juan. The area had a rather slow first half, but with the increase in the last half of 1955 was only a little below the all-time drilling record for northern New Mexico.

In addition discovery of oil in areas southwest and west of major gas production will influence San Juan drilling.

Southeastern Utah, East Central Utah, and the western slope of Colorado is a broad area which is likely to produce some of the major developments of the coming year.

Because of the impending completion of the Pacific Northwest Pipeline, offering first substantial gas market for the area, exploration has been

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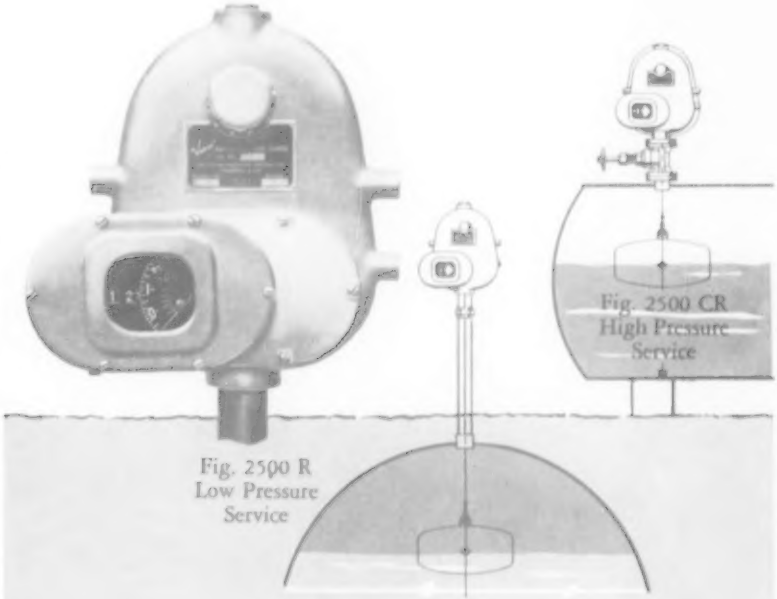

Introducing a special adaption of the Figure No. 2500 series, designed for use on all tanks, below or above ground, where top readings are required.

Elbow sheaves and brackets are eliminated on this model. The stainless steel tape is connected from the gauge head to float in a straight line. Elimination of extra parts reduces friction; therefore, greater accuracy can be expected.

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greatly increased. The area is thus in the same relative position as were oil producing areas east of the continental divide when crude pipeline construction began in 1950.

Paradox basin success has revised earlier estimates of the potential of that area. Many major companies have extensive holdings through this basin. Success at North Boundary Butte, and Coalbed Canyon and in the Monticello area of San Juan County in 1955 will be followed up heavily this year.

A number of scattered gas discoveries ranging from a few to 20 million cubic feet per day were made along the eastern boundary of Utah, notably in Grand County. Exploration has been intensified, and development is now indicated.

Western Colorado has had new drilling, both within the areas of earlier production and in rank wildcat areas. Weber oil production was obtained in Thornburg pool. This discovery, and successful extension at Battleship in Jackson County may rank among the most important Colorado developments of the year from the viewpoint of reserves.

Southwest of Clear Creek, in Utah's San Pete County, Three States Natural Gas Co. has shut down a Ferron sand gas discovery following test at the rate of 15 million cubic feet per day.

Test was reported as in the upper portion of a thick section. Drilling will resume in the spring. The discovery may bring the Wasatch plateau to the forefront of Utah activity in 1956.

What's Next?

Big questions of 1956 activity are possibilities in Idaho, where a small gas discovery was completed in 1955, and Nevada, still with only one producing field, although several operators are active there. Additional exploration is certain for these areas, and major developments could result.

Centers of attention, however, will be those areas already mentioned, with the Williston basin, the Denver-Julesburg basin, and the San Juan basin areas to watch on a volume basis.

For discoveries of major import to future years, western Colorado, the Paradox basin, the Wasatch plateau, the Green River basin, and North Central Montana should be watched.

In 1956 the Rockies will drill more than 5,000 wells for the first year in history. Already active areas will assure this. Depending on success in the ranker areas of the region, operations may stay above 5,000 wells for a long time.

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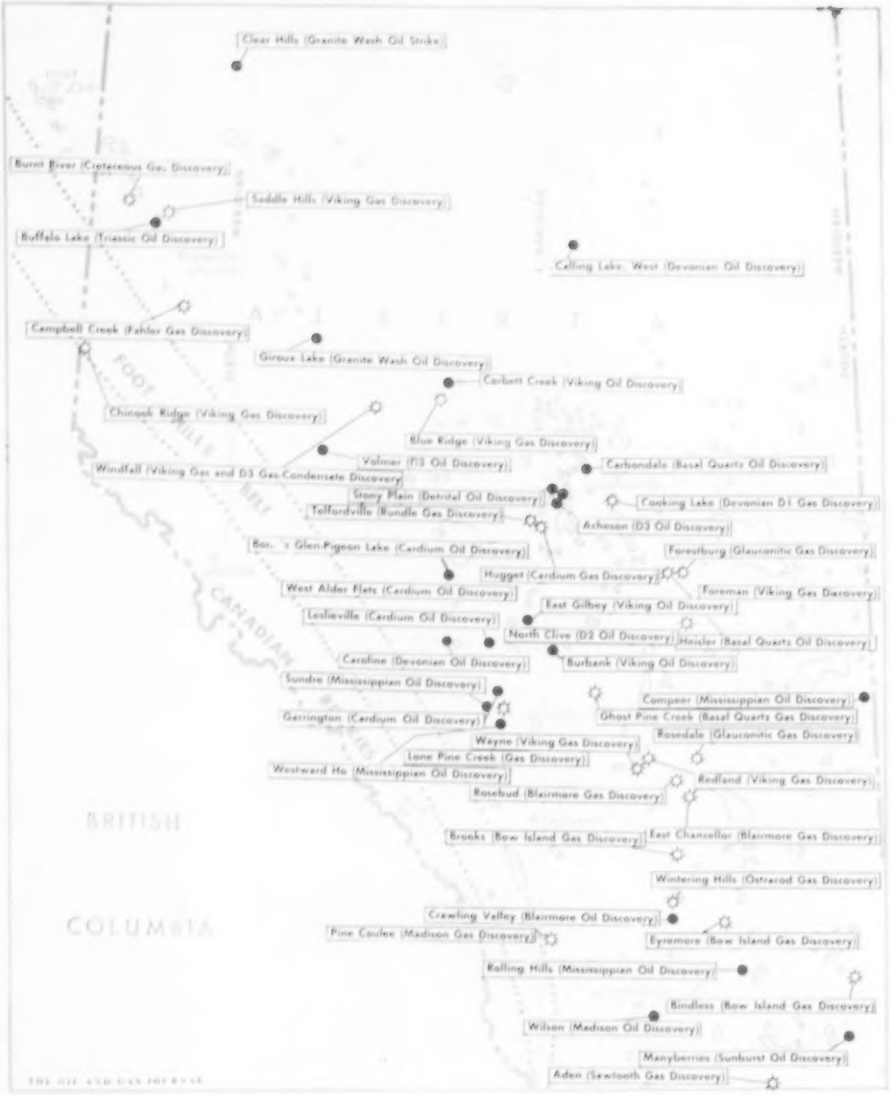
Clear Hills (Granite Wash Oil Strike)
Burnt River (Cretaceous Gas Discovery)
Saddle Hills (Viking Gas Discovery)
Buffalo Lake (Triassic Oil Discovery)
Calling Lake, West (Devonian Oil Discovery)
Campbell Creek (Fahler Gas Discovery)
Giroux Lake (Granite Wash Oil Discovery)
Corbett Creek (Viking Oil Discovery)
Chinook Ridge (Viking Gas Discovery)
Blue Ridge (Viking Gas Discovery)
Valmar (D3 Oil Discovery)
Carbondale (Basal Quartz Oil Discovery)
Windfall (Viking Gas and D3 Gas-Condensate Discovery)
Stony Plain (Detrital Oil Discovery)
Cooking Lake (Devonian D1 Gas Discovery)
Telford-ville (Rundle Gas Discovery)
Acheson (D3 Oil Discovery)
Bar. s Glen-Pigeon Lake (Cardium Oil Discovery)
Forestburg (Glauconitic Gas Discovery)
Hugget (Cardium Gas Discovery)
West Alder Flats (Cardium Oil Discovery)
Foreman (Viking Gas Discovery)
East Gilboy (Viking Oil Discovery)
Leslieville (Cardium Oil Discovery)
North Clive (D2 Oil Discovery)
Heisler (Basal Quartz Oil Discovery)
Caroline (Devonian Oil Discovery)
Burbank (Viking Oil Discovery)
Sundre (Mississippian Oil Discovery)
Compeer (Mississippian Oil Discovery)
Garrington (Cardium Oil Discovery)
Ghost Pine Creek (Basal Quartz Gas Discovery)
Wayne (Viking Gas Discovery)
Rosedale (Glauconitic Gas Discovery)
Lone Pine Creek (Gas Discovery)
Westward Ho (Mississippian Oil Discovery)
Redland (Viking Gas Discovery)
Rosebud (Blairmore Gas Discovery)
Brooks (Bow Island Gas Discovery)
East Chancellor (Blairmore Gas Discovery)
Wintering Hills (Ostracod Gas Discovery)
Crowfoot Valley (Blairmore Oil Discovery)
Pine Coulee (Madison Gas Discovery)
Eyremore (Bow Island Gas Discovery)
Rolling Hills (Mississippian Oil Discovery)
Bindloss (Bow Island Gas Discovery)
Wilson (Madison Oil Discovery)
Manyberries (Sunburst Oil Discovery)
Aden (Sawtooth Gas Discovery)
FOOTHILLS BELT
CANADIAN SHIELD
BRITISH
COLUMBIA

Western Canada

Biggest Year Yet—Record Completions

IN Western Canada's biggest year on record exploration and development work continued at a record high level in 1955. It appears that development work was mainly responsible for the new high marks reached in well completions.

The Regional Story

Among the important discoveries of 1955, all of which have yet to be fully evaluated, are the following finds in Alberta:

. . . Westward Ho. This Mississippian crude-oil discovery 55 miles northwest of Calgary was made in February by the Hudson's Bay-Home Oil Co. team. The discovery well, with 1,000 bbl. initial potential of light crude, has so far been followed up by seven more oil wells and one gas well.

. . . Harmatton. This Mississippian oil discovery 47 miles north of Calgary and 6 miles south of Westward Ho field, was made in December by Home Oil group, following up an earlier Mississippian gas discovery in the area. Over 1,500 bbl. potential is indicated, and initial follow-up wells now are getting under way.

. . . Burbank. This Viking-sand light-crude discovery 6 miles north of Red Deer, was made in October by Imperial Oil Co., Ltd. It may prove to be a major extension to Joffre-Viking sand field, an important field located about 4 miles southeast. Follow-up wells have found thickest Viking sand pay in central Alberta.

. . . Goose Lake. This basal Cretaceous-sand medium-gravity oil discovery 94 miles southeast of Edmonton was made in November by Richfield Oil Corp. Discovery found 50 ft. of pay sand, which swabbed oil at 227 bbl. per day. The first follow-up well is under way.

. . . Clear Hills. This Granite Wash light-oil strike was made in northwestern Alberta, 45 miles northwest of Peace River town, by Gulf Oil Corp. The well gave an initial potential of 600 bbl. per day, but follow-up drilling has brought only three dry holes thus far. The Clear Hills well is primarily important as the first strike of oil in the Granite Wash formation. It has helped spark a larger exploration play in northwestern Alberta.

. . . Pine Coulee-Parkland. This Mississippian limestone wet-gas discovery 55 miles south of Calgary was made by Texaco-Baysel team in April. The discovery gave about 10,000 M.c.f. of wet gas per day with 340 bbl. distillate. The first confirmation well, 1½ miles south, since completed as an even better wet gas well. At year's end a wildcat 6 miles east-northeast of Pine Cou-

Exploration Data

Alberta	
New oil fields	50
New gas fields	48
Wildcat footage	2,210,901
Saskatchewan	
New oil fields	31
New gas fields	10
Wildcat footage	1,438,965
Manitoba	
New oil fields	9
Wildcat footage	176,021
British Columbia	
New gas fields	9
Wildcat footage	190,021
Northwest Territories	
New gas fields	1
Wildcat footage	8,944

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Each Flexitallic Gasket is designed and engineered to meet specific conditions. Spirally-wound V-crimped plies of required metal with alternating plies of proper filler result in a resilient gasket having characteristics of a calibrated spring.

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"Both majors and independents participate in spirited land play."

lee wells gave indicated commercial oil and gas yield in the Mississippian, and is now being evaluated.

. . . Windfall-Whitecourt. This discovery, 110 miles northwest of Edmonton, is a Devonian D3 zone wet-gas strike. It was made in July by Canadian Fina-Stanolind-Hudson's Bay team. Drill-stem tests showed 330 ft. of D3 reef above water line, with at least 200 ft. yielding large gas and condensate flows. The well is now capped pending market. This is a major discovery prospect. The first follow-up well 2 miles southwest is now being drilled.

. . . Campbell Creek. This Fahler sand-Cretaceous gas discovery near Grande Prairie, is 235 miles northwest of Edmonton. It was made in April by Anglo-Canadian & Associates. The well rated 33,000 M.c.f. of gas per day and is now capped pending market. No confirmation test has been drilled.

. . . Calgary. This Devonian D1 (Crossfield) gas discovery is located 4 miles east of the city limits of Calgary. It was discovered in May by Socony-Mobil Co. The well showed potential of over 10,000 M.c.f. per day, highly sulfurous. It is now capped. No confirmation has been drilled.

Saskatchewan

Here are the important highlights of the Saskatchewan picture during 1955:

The discovery of light-gravity oil in the Mission Canyon zone of the Mississippian by Mobil Oil of Canada, Ltd., and its associates, Woodley Canadian Oil Co. and Southern Production Co., Inc., in the Nottingham area of southeastern Saskatchewan during the first month of 1955 kept the spotlight following Saskatchewan exploration activity focused on that sector of the province. The initial discovery of 1955 proved to be a good one and follow-up drilling activity yielded 34 oil successes and only two dry holes in what is now classed the Nottingham oil field. Other strikes, which may prove to be as prolific as the Nottingham discovery, were also recorded in the hot spot in southeast Saskatchewan that stretches east from the city of Weyburn to the Manitoba border and north from the United States boundary approximately 55 miles.

Some of the strikes chalked up in 1954 in this sector of Saskatchewan developed to oil-field status, notably, Alida, Frobisher, Steelman, and Lampman. Most promising of the 1955 strikes were made in Antler River, Glen Ewen, Ingoldsby, Kingsford, and Ralph areas. In this part of the province a sizable percentage of the petroleum and natural-gas rights are freehold, which has led to a spirited land play with both independents and majors participating.

Geophysical Summary

At the end of 1955 there were 108 geophysical parties operating in Alberta; 23 in Saskatchewan; 1 in Manitoba, 22 in British Columbia, and 2 in the Northwest Territories. The western Canada total at the end of the year was 156 parties in operation.

What's Next?

Alberta's activity will be about the same in 1956 as it was in 1955 with a possible slight increase. Exploration work will be carried out in the same general area with some slight increase of activity indicated for the southern and northern foothills regions of Alberta. This work will be done mainly by the majors on their present holdings in these areas.

A favorable decision regarding the present proposed plans of Trans-Canada Pipe Lines, Ltd., and Tennessee Natural Gas Transmission Co. would greatly speed gas-drilling activity in the southern part of Alberta and then to the central west area of the province which is scheduled to be linked with the Trans-Canada system by the Alberta Gas Trunk Line gas gathering system. It has been estimated that companies would spend about $20,000,000 extra in Alberta this year on gas development and exploration work regarding the export of Alberta gas to the east if the "go-ahead" is given soon enough in the year.

Manitoba . . . Exploration activity for Manitoba could be down slightly this year but that province should experience a small increase in development work. Exploration work in the Northwest Territories is expected to be increased slightly.

Saskatchewan . . . Exploration activity for Saskatchewan in 1956 will be approximately the same as 1955 with a fair increase of development activity expected.

South Louisiana

Area Had One of Its Greatest Years

SOUTH Louisiana, in 1955, experienced one of its greatest exploratory years, both in number of wildcats drilled and in number of oil and gas discoveries. Exploration was widespread with activity and discoveries recorded in nearly all parishes, both onshore and offshore. It reached to steadily greater depths, setting new world records, both in deepest tests drilled and in deepest production. It stretched steadily farther out into the Gulf of Mexico, and into deeper water. Aggregate footage of wildcats drilled exceeded by far that of any previous year.

Although "onshore" exploration and development may have been overshadowed in general interest and novelty by the steadily mounting operations in tidelands areas of the Gulf of Mexico, it was no less important from the standpoint of number of discoveries and new production and potential reserves uncovered. Exploration on the land side of the coast continued attractive, and important discoveries continued to be made despite the intensive and widespread exploitation of this area over many years.

Possibly the greatest concentration of drilling was in the Mississippi River Delta area of Plaquemines Parish and adjacent offshore areas at the southeastern tip of the state. Active drilling there resulted not only in the discovery of many separate producing areas and reservoirs, but also the linking the important South Pass Block 24 and Dixon Bay fields into a single major, multiple-pay offshore-onshore field, engulfing other new extension discoveries.

The most active single field probably was at Clear Creek, a field discovered in July 1953, but now stretching over a widespread area straddling the Allen-Beauregard parish line. Development, proving up an 8,900-ft. Cockfield sand, was intensified during 1955 by long stepout discoveries. Drilling in most other South Louisiana fields followed normal steady, consistent development procedure. But, in the aggregate, spread over many fields and areas, nearly 300 drilling rigs were op-

Exploration Data

Total discoveries	**186**
(Oil, 161, and gas, 25)	
New oil fields	**51**
New gas fields	**13**
Total wildcats	**453**
(Up 25 per cent)	
Success ratio, per cent	**41**
Wildcat footage	**5,257,514**

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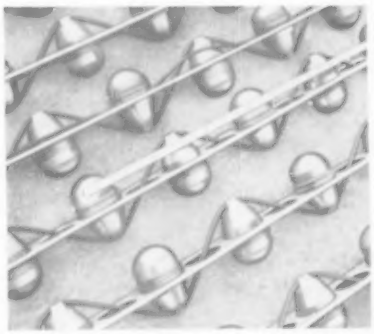
Super Casing Glass Jets Shoot 320 Holes in One Run

A McCullough Super Casing Glass Jet Perforator with Steel Strip Carrier was used to perforate an 80' pay zone at approximately 9300 feet.

Only one run in the hole was required to shoot the 320 Glass Jets, four holes per foot, through 5½" O.D. 17 lb. N-80 casing cemented in 9" hole.



Sections of McCullough Glass Jet Perforators and Steel Strip Carriers. After perforator is fired, the Steel Strip Carrier is removed from the well intact.

After perforating, the well came in for 210 barrels of oil and 2⅝ million cubic feet of gas per day.

Only two hours were required to complete this job, including rigging up and tearing down time.

Their ability to perforate pay zones of nearly any thickness or multiple zones in a single run in the hole, makes McCullough Glass Jet Perforators with Steel Strip Carriers of particular value to the operator.

Carriers may be loaded full length or sections may be left blank to leave unperforated areas in the casing. Steel Strip Carriers in excess of 100 feet in length have been run with complete satisfaction.

Result: Less rig time; greater efficiency; more economy.

Power Packed Glass Jets Perforate for 15,500,000 CF/D

McCullough Standard Casing Glass Jets Shoot 336 Holes in 4½" O. D. Drill Pipe Liner at 15,000'

Deep penetrating McCullough Standard Casing Glass Jets turned in a highly successful, time-saving performance in a deep New Mexico gas well, according to a recent field report.

After drilling to a total depth of 15,120 feet, 3,010 feet of 4½" O.D. drill pipe was set as a liner. The hole was full of 13 lb. mud and hydrostatic pressure at the perforating depth was 10,200 lbs.

Two runs were made with 2½" Standard Casing Glass Jets in Steel Strip Carriers; one 45 feet in length, the other 39 feet. Tapered weights were run on the bottom of the Steel Strip Carriers to enable them to enter the top of the drill pipe liner at 12,062 feet.

McCullough Glass Jets are the best jet perforating process available. They have more power, penetrate deeper through multiple strings of casing and extra thick cement sheaths into hard and extra hard formations. Holes are larger, more uniformly round and are straight sided almost the entire depth of penetration. This means more exposed formation area, greater production, more oil!

336 Standard Casing Glass Jets, four per foot, were fired in 84 feet of zone between 14,942 and 15,026 feet.

On test, the well produced 15,500,000 cubic feet of natural gas per day—a new gas field discovery.

Several factors contributed to the operators full satisfaction with this job. First, the use of 2½" Glass Jets in Steel Strip Carriers made it possible to run inside the restricted I.D. of the 4½" drill pipe liner and gain effective penetration through the thick walled pipe with the full power of the Standard Casing Glass Jets. McCullough Glass Jet Perforators use a more powerful shaped charge in relation to their outside diameters than any other jet perforators available.

Second, the entire job including rigging up, two round trips to 15,000 feet and tearing down, took only five hours rig time—an important saving in costs.

Third, as usual both Steel Strip Carriers with weights were removed from the well intact and no junk was left at the bottom of the hole to complicate future operations.

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LOS ANGELES
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"Many promising discoveries were in deeper sands near adjacent fields."

erating in the region at the close of 1955, an all-time record.

Since few of 1955's new fields have more than their respective discovery wells, it would be difficult to single out the area's most important discovery of the year. Several discovery wells have given indication of having opened major, prolific fields. Included in these is one of the year's latest discoveries,—that by Harry W. Bass in the northwestern corner of Beauregard Parish, just across the state line from Texas' Newton County. This discovery well is oil productive from a 7,900-ft. upper Wilcox sand.

Bosco Shows Promise

The new South Bosco field, a March discovery, on the Acadia-Lafayette parish line, is another having promise of prolific production. There, three sizable oil wells have been completed in two deep Frio sands, one at 12,100 ft. and the other below 13,200 ft. Acadia Parish yielded at least three other good-appearing new-field discoveries, judging from the records of their discovery wells.

Among the year's offshore discoveries, the multiple-pay field opened in December by the C.A.T.C. group (operated by Continental Oil Co.) in Block 47, Grand Isle area, 20 miles off the coast of Jefferson Parish, generally is looked upon as the most important. Only the discovery well has been completed, but it logged at least eight potentially productive Miocene sands below 9,845 ft. The well was drilled to 15,058 ft., and is completed in two of these sands, one at 13,600 ft. and the other at 9,875 ft., with prolific oil production from each. Location of the well is in water 97 ft. deep, a record.

Continued exploration in the low-lying marsh region of Cameron, Vermilion, and other coastal parishes brought to light additional prolific gas-condensate, as well as oil reservoirs in deep sands.

Many of the region's most promising discoveries and exploration efforts were in deeper sands in and around existing fields, some opening major extension areas. As always, the old, in many cases, extensively wildcatted shallow, piercement-type salt domes continued attractive for additional exploration.

The world's deepest production remained at Weeks Island, in Iberia Parish. Its continued development, in a 17,000-ft. sand off the north flank of this old shallow, piercement-type dome, resulted in additional spread of the productive area with new productive depth records being recorded. The deepest production now is in a well completed with perforated interval at 17,572-68 ft.

New Depth Record Set

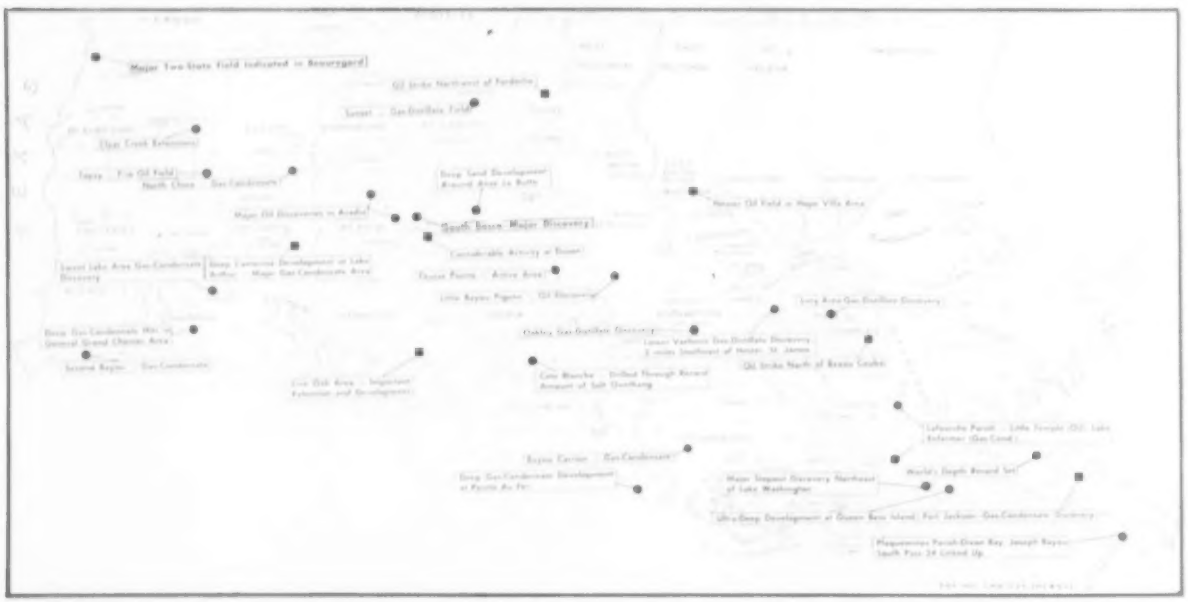
A wildcat test, located in Plaquemines Parish's Mississippi River Delta area was drilled, during the year, to 22,559 ft., setting a new world's drilling-depth record, 1,077 ft. below the previous record held by a California well. With oil and gas showings reported in sands below 20,000 ft., it threatens the producing depth record at Weeks Island. Location of this test is northeast of the old, shallow Lake Washington dome, around and off the flanks of which exploration has been carried to depths of 16,000 and 17,000 ft. in several tests.

At Cote Blanche, in St. Mary Parish, commercial gas-condensate production was opened in a 16,400-ft. sand found underlying an overhang through which a record thickness (11,840 ft.) of solid salt was drilled. Cote Blanche is a shallow, piercement-type dome, one of the old "Five Islands," around which deep, flanking sands have been found productive only within recent years.

New production at depths below 16,000 ft. also was discovered at Queen Bess Island, a deeply seated salt-dome type of structure located in the Barataria Bay area in the coastal marsh region of Jefferson Parish.

The deeper exploration trend in coastal Louisiana is reflected in the fact that there were 173 more wells drilled to depths below 10,000 ft. during 1955 than in the previous year. Of the 1,948 wells completed in the area during the year, 1,025 were at depths below 10,000 ft.; 418 of these being below 12,500 ft.; and 70 below 15,000 ft. Only 35 were completed below 15,000 ft. in 1954. South Louisiana led all areas in number of wells completed at these depths.

The current year should witness a continuation of these trends, further expansion of exploration and development of these deeper horizons, both in and around existing fields and in previously unproductive areas, and a substantial stepup in drilling in offshore areas, generally regarded as Louisiana's greatest remaining exploratory realm and potential oil and gas reserve.


Major Two-State Field Indicated in Beauregard
Oil Strike Northwest of Pardeeville
Largest Gas-Distillate Field
Deep Oil Discoveries in Acadia
South Bosco Major Discovery
Considerable Activity in Bosco
Deep Commercial Development in Lake Arthur Major Gas-Condensate Area
Lower Lake Area Gas-Condensate Discovery
Deep Gas-Condensate Min. Vi... General Grand Chenier Area
Deep Land Development Around Avoca Is. Butte
Nonce Oil Field in Napo Villa Area
Little Bayou Pigeon Oil Discovery
Long Area Gas-Distillate Discovery
Oakley Gas-Distillate Discovery
Lower Vanhorn Gas-Distillate Discovery
Oil Strike North of Bayou Choctaw
Cote Blanche Drilled Through Record Amount of Salt Overhang
Lafourche Parish Little Temple Oil Lake Extension (Gas-Cond.)
Bayou Carlin Gas-Condensate
World's Depth Record Set
Deep Gas-Condensate Development at Pecan Is. Fld.
Major Deepest Discovery Northeast of Lake Washington
Ultra-Deep Development at Queen Bess Island, Fed. Jackson Gas-Condensate Discovery
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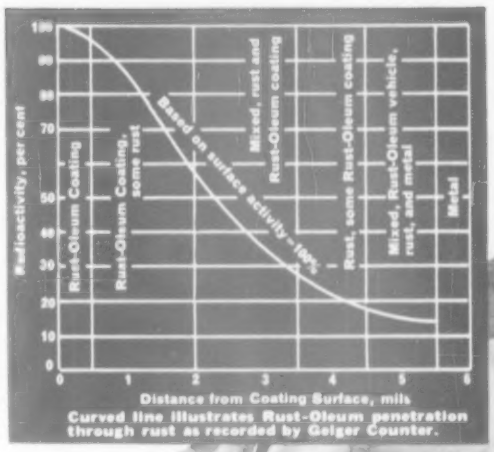
PENETRATION

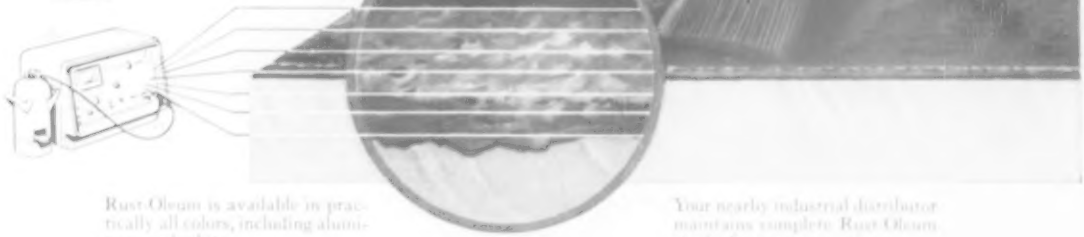
through rust to bare metal traced by Geiger Counter. To effectively stop rust—the vehicle of a protective coating, when applied over a sound, rusted surface—must penetrate through the rust down to bare metal. **Rust-Oleum does exactly that!—as proved by radioactive research!** Rust-Oleum's specially-processed fish oil vehicle was radio-activated and formulated into Rust-Oleum 769 Damp-Proof Red Primer—then applied to rusted test panels. Penetration *through rust* to bare metal by Rust-Oleum's specially-processed fish oil vehicle was then traced by Geiger Counter.

You stop rust, because Rust-Oleum's fish oil vehicle soaks deep down to bare metal and into the tiny pits where it drives out air and moisture that cause rust. You save, because this same *penetration* enables you to apply Rust-Oleum directly over rusted surfaces—usually eliminating costly surface preparations. Attach coupon to your letterhead for your thirty-page report entitled, "The Development of a Method To Determine The Degree of Penetration of a Rust-Oleum Fish-Oil Based Coating Into Rust On Steel Specimens," prepared by Battelle Memorial Institute technologists.



Curved line illustrates Rust-Oleum penetration through rust as recorded by Geiger Counter.

There is only one Rust-Oleum. It is distinctive as your own fingerprint. Accept no substitute. Buy—and specify only Rust-Oleum. You'll be happy that you did.



Rust-Oleum is available in practically all colors, including aluminum and white.

Your nearby industrial distributor maintains complete Rust-Oleum stocks for your convenience.

RUST-OLEUM®

STOPS RUST!

See our Catalog in Sweets, or write for complete information.

ATTACH TO YOUR LETTERHEAD—MAIL TODAY

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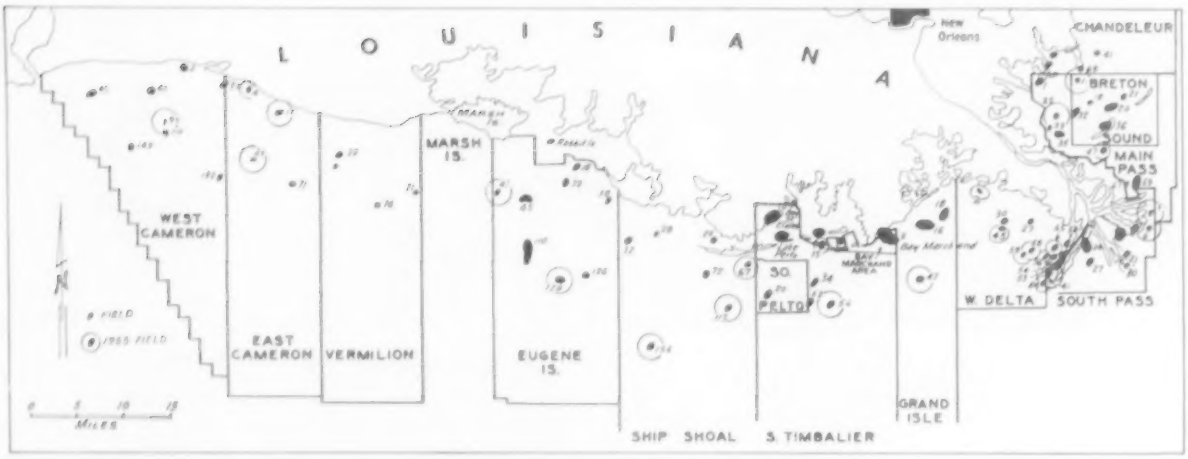
- ☐ Complete literature including color charts.
- ☐ Thirty-page report on Rust-Oleum penetration.
- ☐ Nearest source of supply.



Louisiana Now Numbers 74 Offshore Fields

EXPANDING exploration on Louisiana's Continental Shelf areas in 1955 uncovered 26 new oil and gas fields. These are exclusive of the additional reservoirs and multiple productive horizons proved in these and previously discovered fields. Seven of the year's discoveries were confirmed, six of them with additional pay zones.

Last year's new discoveries boosted to 74 the total number of Louisiana's offshore fields, spread from the state's western extremity off the coast of Cameron Parish, around the Mississippi River Delta area, and into the Breton Sound and Chandeleur Sound areas off the state's southeastern shore. Attesting to the efficiency and accuracy of geophysical exploration in locating offshore fields, it is significant that 56 of the first 70 fields discovered were opened by their respective first tests.

Discovery wells last year represented nearly 42 per cent of the tests drilled on wildcat blocks, a success ratio of nearly 1 well to 1½ tests drilled. Fifteen new fields proved productive of oil; seven others were gas-condensate reservoirs, and four were dry gas.

At the close of the year, there were 53 active drilling operations in Louisiana's tidelands. Thirteen of these are on wildcat locations not directly associated with any existing field. The remaining 40 were in or near known productive areas. The latter were spread over 22 fields. Altogether, more than 260 wells were drilled at offshore locations during the year. More than 200 of these were in and around known fields.

The number of rigs running in offshore work at the close of the year was greatly under early predictions of activity, but much of the expected new drilling was delayed by inability of shipyards and other suppliers of marine equipment to meet the demand for barges and drilling structures.

1955 LOUISIANA OFFSHORE NEW-FIELD DISCOVERIES

Area and discovery company—	Block	Disc. date, mo.-day	Prod.	Prod. interval (ft.)	Total depth (ft.)	Additional tests: Comp.	Additional tests: Drlg.
West Cameron:							
Pure	99	7-20	Dry gas	1,707-09	12,900	0	0
East Cameron:							
Forest	4	8-31	Gas-cond.	13,111-21	14,548	0	0
Shell	17	3-16	Gas-cond.	11,956-66	13,719	[3]	0
C.A.T.C.	49	9- 5	Gas-cond.	11,090-97	11,896	0	0
Eugene Island:							
Pure	47	3-15	Gas-cond.	8,483-87	11,362	[1]	0
Magnolia	128	6-10	Oil	9,364-9,516 10,110-30	11,029	[1]	1
Ship Shoal:							
Magnolia	113	7-28	Oil	7,446-52 7,529-38	11,407	1	1
Gulf	154	8- 8	Oil	6,196-6,222	6,919	[2]	0
Ocean	67	12- 5	Oil	12,137-41	12,183	0	0
South Timbalier:							
Sinclair	15	6-26	Gas-cond.	11,986-96	13,756	[1]	0
Humble	54	5-30	Oil	6,591-6,605	11,831	[1]	1
Grand Isle:							
C.A.T.C.	47		Oil	13,614-20 9,868-74	15,058	0	1
West Delta:							
C.A.T.C.	45	11-25	Oil	5,746-60 7,313-50	12,313	0	1
C.A.T.C.	55	9-24	Dry gas	4,844-52	14,030	0	0
C.A.T.C.	56	5- 9	Gas	4,361-66	12,898	0	0
C.A.T.C.	58	1-31	Gas-cond.	11,668-78	14,580	0	0
C.A.T.C.	59	8-10	Oil	12,732-36	13,259	0	1
C.A.T.C.	84	6-28	Oil	10,857-62	14,500	0	1
Shell et al.	2	12-12	Oil	11,278-88	11,401	0	0
South Pass:							
California	5	5-14	Oil	9,079-90	11,000	0	0
Shell	6	1-16	Oil	8,337-49	11,010	2	0
Shell	30	7-10	Dry gas	9,528-46	13,468	0	0
California	41	4- 2	Oil	10,096-10,108	13,972	0	0
Main Pass:							
Continental	25	3-28	Oil	6,224-30	10,002	[4]	0
Kerr-McGee	47	7- 5	Oil	8,192-8,218	8,600	[1]	0
Breton Sound:							
Republic Nat.	1	5-11	Gas-cond.	7,421-23	8,999	[3]	0

(1) Two dry holes and one gas-condensate well in deeper pay (12,315-30 ft.); (2) dry hole at 13,577 ft.; (3) dual oil producer in two new-pay zones (10,424-36 and 11,582-93 ft.); (4) one dual oil well in sands at 6,322-35 ft. and 6,525-40 ft., and one dual oil and gas-condensate well in sands at 6,215-25 ft. and 6,639-50 ft.; (5) dry hole at 13,648 ft.; (6) oil well in new-pay zone (6,854-66 ft.); (7) dry holes; (8) gas-condensate well in new pay (7,710-15 ft.); (9) dry holes.

Pumping Progress Report

FOR PETROLEUM ENGINEERS

An advertisement prepared by the Aldrich Pump Co., Member of Hydraulic Institute, U.S.A.

SPACE, in many pump installations, is a major problem. Another is the necessity for special foundations. When new installations are considered, these factors may dictate more elaborate construction than should be necessary. And for replacement or modifications of existing systems, they may require expensive piping and equipment changes.

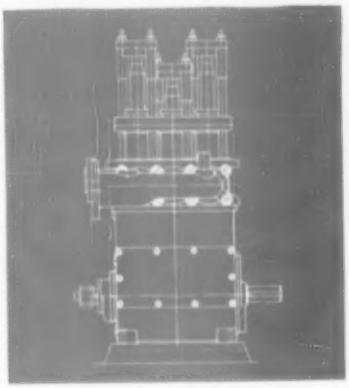
COMPACTNESS OF DESIGN, while often desirable, is not necessarily the answer. Simplicity of design — as in the case of ALDRICH Direct Flow Pumps — may be a better solution.

SIMPLICITY OF DESIGN brought about the first inverted Triplex and Quintuplex Pumps and ultimately Septuplex and Nonuplex Pumps. This Aldrich design innovation brought to pump users many economies of space, maintenance and operation they had never known.

INVERTED PUMP DESIGN permits the use of less expensive foundations. With the crankshaft located near the floor there is no need for expensive foundation work to raise the driver or lower the pump. Then, too, inverted pumps require fewer square feet of floor space than conventional pumps.

MAINTENANCE COSTS ARE REDUCED. Fluid-end, where most work is done, is at chest level. Bearing replacements are made without removing heavy crankshafts or connecting rods. Crossheads on all Direct Flow Pumps can be worked on or removed from pump without disturbing fluid-end.

TELL US ABOUT YOUR PUMPING PROBLEM. The chances are that one of our standard pumps — or a modification of one — will do your job. Detail your problem and we'll send you a copy of the Data Sheet that describes the Direct Flow Pump we recommend. Write to: The Aldrich Pump Company, 9 Gordon Street, Allentown, Pa.



Aldrich inverted vertical pump design

. . . for your tough pumping problems specify ALDRICH

The entire line of Aldrich Direct Flow Pumps feature two outstanding design innovations—inverted vertical design and sectionalized fluid-ends. These two features have helped make Aldrich the organization hydraulic engineers turn to when they face tough pumping problems. If you have a pumping problem, turn it over to the men who have never turned down a challenge.

CHECK THESE ADVANTAGES OF INVERTED PUMP DESIGN:

Smaller Foundations
Simpler connection with prime mover
Less floor space required
Reduced maintenance costs

Write today for Data Sheets describing the Direct Flow Pump Series.

THE ALDRICH PUMP COMPANY

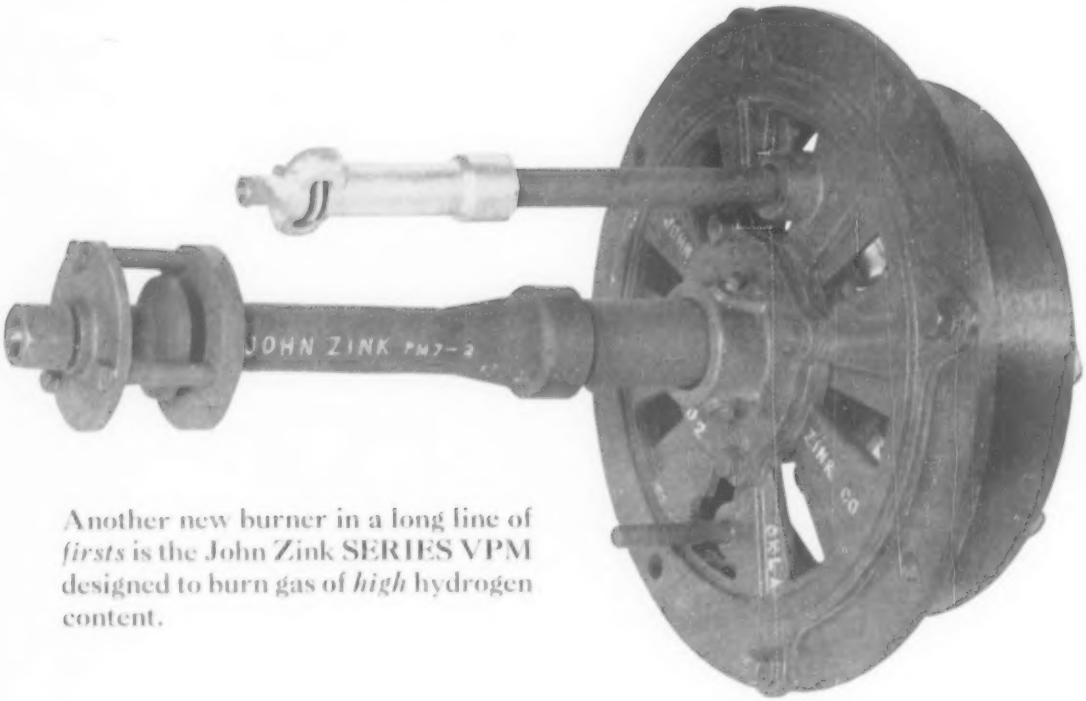
Originators of the Direct Flow Pump
9 GORDON STREET
ALLENTOWN, PA.
Representatives in principal cities

JOHN ZINK

JZ

VPM BURNER

with the John Zink ST pilot



Another new burner in a long line of *firsts* is the John Zink SERIES VPM designed to burn gas of *high* hydrogen content.

Burns with a short and crisp flame with primary air door open. The new high efficiency aspirator on the SERIES VPM burner makes it possible to switch from a *high* hydrogen gas fuel to natural gas.

Capacities from 500,000 Btu hr. to 12,000,000 Btu hr.

JOHN ZINK COMPANY

4401 South Peoria — Tulsa, Oklahoma

Illinois Basin Has Stirring Year

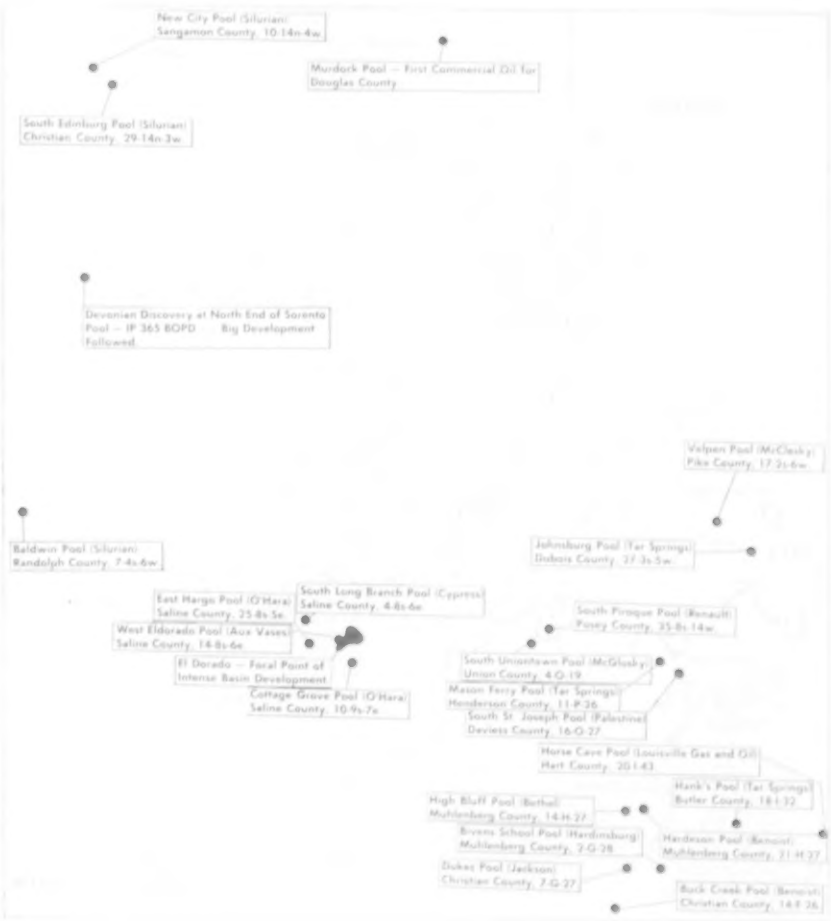
EXPLORATORY and development work in the Illinois basin was at its highest peak since the "boom days" of the late '30's and the late '40's. The most significant discoveries in the basin were recorded in the southern and northern portions. Heavy development of new and existing fields piled record production figures on state lists. Intense wildcat activity was noted in every section of the basin except Indiana. Illinois and western Kentucky took most of the exploratory and development glory in the basin.

The Regional Story

The north and south ends of the Illinois basin led the exploratory parade in the Eastern Interior Province. Saline County on the south, and Sangamon County on the north were the focal points of the most significant wildcat activity in Illinois. In Kentucky, Christian County recorded 136 wildcat completions to take the lead in that state. Both Illinois and western Kentucky were highly active last year.

Exploration Data

Illinois	
New oil fields	24
New gas fields	5
Total wildcats	635
(Up 35 per cent)	
Wildcat footage	1,354,932
Success ratio, per cent	12
Indiana	
New oil fields	7
Total wildcats	261
(Up 16 per cent)	
Wildcat footage	373,424
Success ratio, per cent	4
Western Kentucky	
New oil fields	30
Total wildcats	376
Wildcat footage	494,411
Success ratio, per cent	15


New City Pool (Silurian)
Sangamon County, 10-14n-4w
Murdock Pool — First Commercial Oil for Douglas County
South Edinburg Pool (Silurian)
Christian County, 29-14n-3w
Devonian Discovery at North End of Sorento Pool — IP 365 BOPD — Big Development Followed
Baldwin Pool (Silurian)
Randolph County, 7-4s-6w
Velpen Pool (McClosky)
Pike County, 17-2s-6w
Johnsburg Pool (Tar Springs)
Dubois County, 27-3s-5w
East Hargo Pool (O'Hara)
Saline County, 25-8s-5e
South Long Branch Pool (Cypress)
Saline County, 4-8s-6e
West Eldorado Pool (Aux Vases)
Saline County, 14-8s-6e
El Dorado — Focal Point of Intense Basin Development
Cottage Grove Pool (O'Hara)
Saline County, 10-9s-7e
South Pinnque Pool (Renault)
Posey County, 35-8s-14w
South Uniontown Pool (McClosky)
Union County, 4-O-19
Mason Ferry Pool (Tar Springs)
Henderson County, 11-P-26
South St. Joseph Pool (Palestine)
Daviess County, 16-O-27
Horse Cave Pool (Louisville Gas and Oil)
Hart County, 20-14-3
Hank's Pool (Tar Springs)
Butler County, 18-13-2
High Bluff Pool (Bethel)
Muhlenberg County, 14-N-27
Bivens School Pool (Hardinsburg)
Muhlenberg County, 2-O-28
Dukes Pool (Jackson)
Christian County, 7-O-27
Henderson Pool (Benoist)
Muhlenberg County, 21-N-27
Buck Creek Pool (Benoist)
Christian County, 14-9-26

Field Development

Eldorado in Saline County was the center of an intense development campaign that overshadowed regional developments. During February alone 15 oil wells were completed in the area for more than 1,000 bbl. per day. Most of the area's wells produce from the Waltersburg sand of Mississippian age. There are nine pay sands in the area, ranging from Palestine to McClosky in age. Some wells made as much as 4,500 bbl. daily. The area is now almost developed.

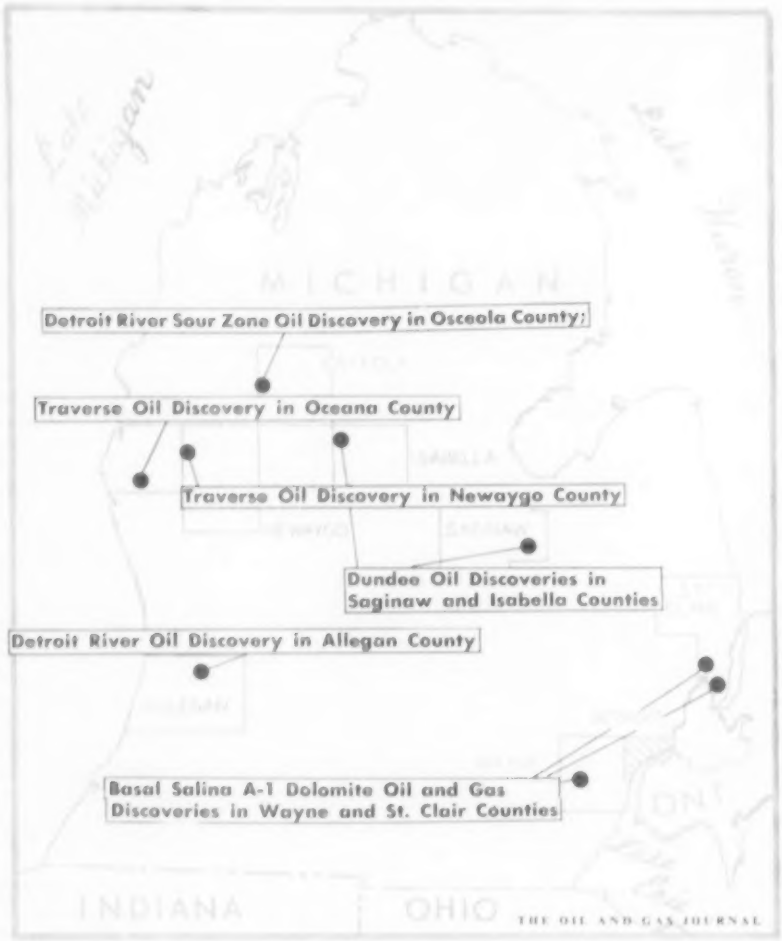
One of the state's late-year important developments was the completion of five good oil wells in Oak Point field, Clark County, and the discovery of West Oak Point pool. This Oak Point area had been abandoned and was revived only recently. There were seven wells drilling in the area in December. Completion was reported in November of a Cypress sand gas well in Cooks Mills Consolidated field with an initial flow capacity of 24,000 M.c.f. of gas per day. This is one of the biggest gas wells ever completed in Illinois.

Bond County had one of Illinois' best success stories. In September a Devonian sand well was completed on the north side of Sorento pool with an initial production of 365 bbl. daily. During October four more Devonian sand wells were completed with high initial production.

Four Aux Vases areas deserve special mention: Cantrel Consolidated in Hamilton County, which has been outstanding for more than a year, and three pools in which new areas have been opened up. Roland Consolidated and Maumie North Consolidated in White County, and Dale Consolidated in Hamilton County. Maximum initial production of the Aux Vases-Mississippian wells was 1,350 bbl. in a well in Dale Consolidated.

What's Coming?

Indications point to another big year for the Illinois and western Kentucky portions of the basin. With the big push in the Eldorado area slowing down as the area becomes developed, basin wildcatters have begun searching for another big field prospect. The southern end of the basin will play an important role in the 1956 campaign as will the northern area near Springfield. The current program in Christian County, Kentucky, is due to continue throughout the better part of the year. Production and completions will likely surpass the 1955 records in both states.


Detroit River Sour Zone Oil Discovery in Osceola County
Traverse Oil Discovery in Oceana County
Traverse Oil Discovery in Newaygo County
Dundee Oil Discoveries in Saginaw and Isabella Counties
Detroit River Oil Discovery in Allegan County
Basal Salina A-1 Dolomite Oil and Gas Discoveries in Wayne and St. Clair Counties
MICHIGAN
INDIANA
OHIO
THE OIL AND GAS JOURNAL

Michigan

Four Pool Openers Mark Efforts

EXPLORATORY drilling, like all drilling activity in Michigan, was slower in 1955 than in any previous year during the past 17. In all, an even dozen discovery wells were credited to Michigan wildcatting during the year. Ten of these were oil wells and two were gas strikes. Both of the gas discoveries were A-1 basal Salina dolomite gas wells. Of the ten oil discoveries, only four were out and out pool openers. The others were new-pay discoveries in older pools, developed either by drilling new holes to the discovery objective, by deepening older producers in the pool, or by reworking wells drilled out dry in other objective horizons.

The Regional Story

One discovery appeared to be more significant than all the rest, on the basis of follow-up drilling completed before the end of the year. This strike was the new Traverse discovery in Newaygo County where the first three follow-up offsets were all completed as producers.

A Detroit River oil discovery well in Allegan County, which was not much of a producer itself, was considered most important as a possible indication of what may be found by drilling below the Traverse in the southwestern part of Michigan. Somewhere, perhaps at offsets to this discovery, good production may be found in the new, deeper objective. This development may reactivate southwestern Michigan exploration and development.

Exploration Data

Michigan	
New oil fields	12
New gas fields	2
Total wildcats	212
(Down 12 per cent)	
Wildcat footage	628,557
Success ratio, per cent	6

Field Development

A new, shallower Traverse oil pay was developed in Skeels Richfield pool, Clare County; a Dundee pool was opened in Gilmore Township, Isabella County, where development is expected to be good but small in area; a deeper Detroit River "sour zone" pay was developed in Wise Dundee pool, Isabella County. A shallower Traverse oil pay was developed in Reynolds Reed City oil pool, Montcalm County; a small Traverse oil discovery was drilled in Otto Township, Oceana County; a Detroit River "sour zone" oil pay was developed at dry Richfield objective well in Reed City pool, Osceola County, this one important. Other discoveries were in St. Clair, Saginaw, and Wayne counties.

What's Next?

The success of the Detroit River discovery in Allegan County last year should give some new life to exploration in southwestern Michigan. Little previous drilling below the Traverse in this region is on the drilling records.

Southeastern Michigan will see a continuation of the oil and gas search in the basal Salina dolomite, particularly in the Detroit area.

Appalachian

Ohio Gets Some Important Hits

ALTHOUGH wildcatting was held to a minimum again last year, and drilling held mainly to the extension of existing fields, several important discoveries were made in 1955 in Ohio. In the old Pennsylvanian Grade fields operations proved that the fields are far from depleted, and promising areas are being developed, although no actual new discoveries were made.

Exploration Data

Ohio	
New oil fields	5
New gas fields	7
Total wildcats	27
(Up 22 per cent)	
Wildcat footage	94,324
Success ratio, per cent	44

The Regional Story

In Coshocton County, with large undrilled and potential areas, oil pools were found east and south of Layland and east of Perry field. A potential gas field was found east of Bethlehem pool.

West of Rayalton pool in the Cleveland area, a promising oil discovery is being developed. In Holmes County

FIVE OUT OF SEVEN pipeline contractors on the 561-mile Transco 30″-36″ superinch line use Cleveland Trenchers. On this big job of oversize trench for Transco, these Cleveland 320's consistently produced high daily footage—day in and day out. Because of their outstanding maneuverability and versatility, these same "320's" are also employed efficiently and profitably on smaller diameter pipelines—paying *extra* dividends on the equipment investment. THE CLEVELAND TRENCHER COMPANY, 20100 St. Clair Avenue, Cleveland 17, Ohio

Dowell engineers use thickened crude oil with low fluid loss in Petrojel fracturing treatments.

DOWELL TREATMENT CARRIES SAND FARTHER INTO FRACTURES

PETROJEL*, an exclusive Dowell service, uses your own lease crude, diesel fuel or kerosene to give you an economical, efficient fracturing treatment.

The oil is mixed with special thickening agents in Dowell truck-mounted tanks or in your own lease tanks. The resulting Petrojel fluid has lower surface tension than the original base oil. This makes formation penetration and return of the fluid to the well bore easier. No gel-breaker is required. Additives also control fluid loss and oil thickness permitting sand to be carried farther into the fractures. The result—greater production.

What's more, Petrojel resists thinning at temperatures up to 200° F., making it especially effective in high temperature wells. You can use low treating pressures with Petrojel, too. Field use has shown it requires 500 to 2000 p.s.i. less pressure than other fracturing media when pumping through tubing.

For more information or service, call any of the 165 Dowell offices in the United States and Canada; in Venezuela, contact United Oilwell Service. Or write to Dowell Incorporated, Tulsa 1, Oklahoma, Dept. A-11.

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services for the oil industry

DOWELL

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gas was found east of Greer pool and south of Danville in adjoining Knox County, while small oil and gas discoveries were made in Wayne County.

Flint Ridge field was extended east by a discovery in Muskingum County south of Cottage Hill. Farther south, small gas wells were found in Perry, Noble, and Washington counties.

Pennsylvania-New York

During 1955, 14 wildcat wells were drilled in the north-central Pennsylvania and southern New York region. Of these, five found gas production. No oil discoveries were made. Two of the wildcats are considered to be new field discoveries, and one a new pool discovery in Leidy-Oriskany sand field.

Exploration Data

Pennsylvania-New York	
New gas fields	5
Total wildcats	14
(Down 18 per cent)	
Wildcat Footage	133,337
Success ratio, per cent	36

The Regional Story

The big news of the year was the continued success in obtaining gas production by hydraulic fracturing of the Onondaga chert section of Lower Devonian age. In western Clearfield County, along the trend of the Chestnut Ridge anticline, fracturing stimulated testing which resulted in the discovery of Oriskany sand production, as well as chert production. At the end of the year, eight wells ranging in depth from 7,000-7,500 ft. had been completed in this area. Three of these were dual-zone producers from the chert and Oriskany sand.

In the new-pool discovery northeast of Leidy field in Clinton and Potter counties, Pennsylvania, nine wells were completed with an average open flow of 60,000 M.c.f. per day.

What's Next?

In the past, most Oriskany sand exploratory drilling was on anticlinal highs. Two of the successful 1955 wildcats discovered production in stratigraphic traps in the Oriskany sand. This points up a change in exploratory thinking which will become more apparent in 1956.

The search for Oriskany gas in areas where this formation underlies chert will be especially intensified as a result of the fracturing successes last year. For several years, a deep exploratory drilling program has been predicted for the area, and a few unsuccessful deep tests have been drilled. An increased

long rigid TONG HANGER Saves Wear

Here's How...

When tubing is being spun, the threads force the tubing to move up or down. The tong must either move with it, or else "bite" the tubing by gripping it on the bias. The Foster Tubing Tong is counter-balanced and moves up or down with the joint by means of the long, rigid tong hanger. This exclusive feature keeps the Foster Tubing Tong level, thus prevents biting and eliminates a common cause of tubing damage.

TRAILER MOUNTED to serve several rigs.

Foster

TRAILER MOUNTED HYDRAULIC

TUBING TONG

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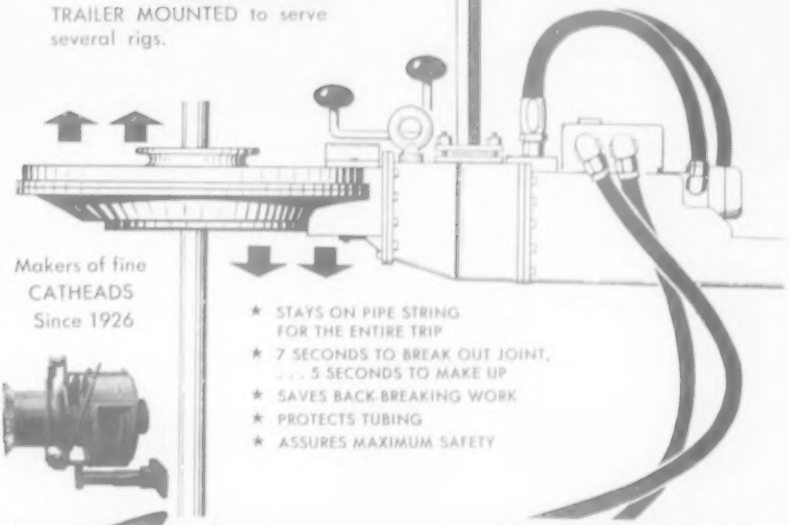
The Foster Tubing Tong grips all tubing, sizes 2⅜" to 3½"—on the upset or on the small of the pipe, without changing dogs or inserts. In addition, it eliminates tubing trouble caused by improper tightening. If the operator desires the pipe made up with 500, 700 or 1,000 foot pounds, a special valve on the hydraulic line can be set so that every joint in the string will be made up to that tightness, no more nor less.

STAYS ON PIPE STRING FOR THE ENTIRE TRIP

The Foster Tubing Tong eliminates all time lost in putting tongs on the pipe and removing them . . . reduces break-out and make-up time to one-third of that formerly required. 7 seconds to break out joint, 5 seconds to make up joint.



Makers of fine CATHEADS Since 1926

★ STAYS ON PIPE STRING FOR THE ENTIRE TRIP
★ 7 SECONDS TO BREAK OUT JOINT, . . . 5 SECONDS TO MAKE UP
★ SAVES BACK BREAKING WORK
★ PROTECTS TUBING
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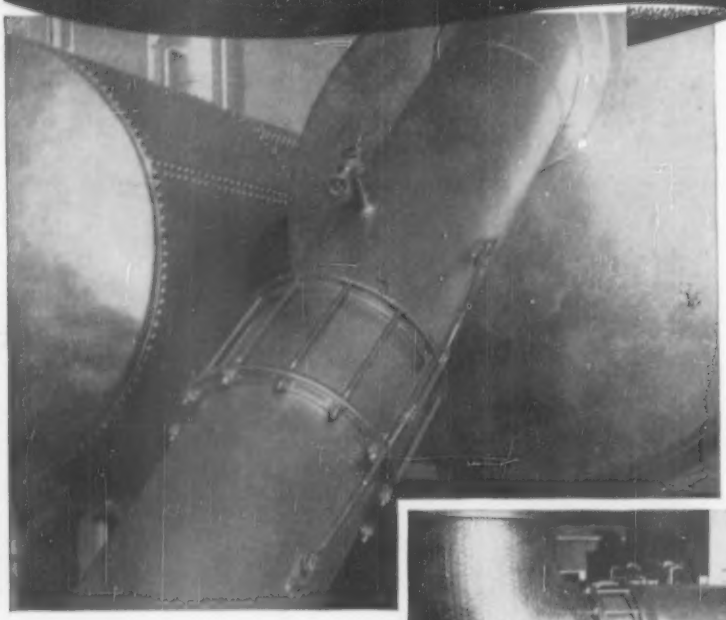

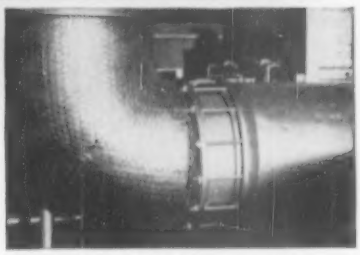

TOP—20" Style 38 Dresser Coupling installed on field gas scrubber line. BELOW—24" coupling in gas-treating plant.

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Exploration Summaries

interest in the area by several major companies and improved rotary-drilling methods should result in an upswing in deeper testing in the coming year.

EASTERN KENTUCKY

During the year 1955 eastern Kentucky experienced considerable wildcat drilling. Twenty-three rank wildcats resulted in the finding of seven new gas fields, and one oil field for a success ratio of 35 per cent. Most of the discoveries, however, were small. Bulk of the wildcatting was carried on in the counties of Clay, Leslie, and Breathitt by United Fuel Gas Co. with the Mississippian, Devonian, and Silurian being the primary objectives.

Very few tests were drilled to the deeper Ordovician and Cambrian sediments. However, one test discovered gas in the Knox formation on the Rockcastle River uplift in Laurel County. More drilling is planned to evaluate the prospect. Deepest test for eastern Kentucky was a 5,697-ft. wildcat located in the Middlesboro basin in Bell County and bottomed in the Knox dolomite. No encouraging shows were logged.

Field activity was limited generally to the continued development of the Devonian shale gas Big Sandy gas field of Pike, Knott, Floyd, Martin, and Magoffin counties. The Oil Springs water-flood project in Magoffin and Johnson counties remained active. At year's end the field has been fairly well completed with operators exploring some of the other shallow Weir (Mississippian) sand pools in the region with test drilling and pilot floods.

For 1956 it is expected that water flooding will occupy the time and efforts of the operators in the areas of possible shallow floods. No deep (Cambro-Ordovician) play is foreseen. However, search for new Devonian and Silurian fields will probably keep pace with the tempo experienced in 1955, and the fields discovered in 1955 will be evaluated with confirmation testing.

Southeastern States

Two of Year's Hottest Strikes Awakened Dixie Interest

EXPLORATION during 1955 in the country's southeastern states, primarily Mississippi, reflected the growing interest in potentialities of Lower Cretaceous and deeper formations as

Exploration Summaries

Exploration Summary	
Mississippi	
New oil fields	12
Total wildcats	182
(Up 66 per cent)	
Wildcat footage	1,274,204
Success ratio, per cent	6.5
Alabama	
New oil field	1
Total wildcats	40
(Down 29 per cent)	
Wildcat footage	195,819
Success ratio, per cent	2.5
Florida	
Total wildcats	29
(Down 3.33 per cent)	
Wildcat footage	187,518
Georgia	
Total wildcats	2
(Down 71 per cent)	
Wildcat footage	9,251

sources of additional petroleum reserves.

Except in southwestern Mississippi, where exploration for new production in Tertiary-Wilcox sands was dominant, most wildcat tests and many new-field wells had Lower Cretaceous or deeper objectives. Until comparatively recent years relatively few tests were taken below the Upper Cretaceous-Tuscaloosa sands, except in the Black Warrior Paleozoic basin of northeastern Mississippi and northwestern Alabama, and in Florida.

Encouragement for Lower Cretaceous exploration has been given by development of prolific oil reservoirs in Rodessa and Sligo sands at Mississippi's tricounty Soso field. These 12,000-ft. reservoirs, discovered in August 1953, reached a peak development during 1955. More than 45 wells were completed during the year, boosting the total to nearly 70. A previously indicated Lower Cretaceous-Paluxy reservoir was opened in the field during the year.

Although greatly overshadowed in importance by Soso, development of Lower Cretaceous sands at Bolton, a 1954 discovery in Hinds County, continued fairly active and gave added incentive to new deeper exploration throughout the region. Of Bolton's 17 wells completed to date, 11 were in 1955. Main production at Bolton is from the Paluxy zone, in which 15 wells have been completed. The field's less-explored deeper Rodessa sand has only two wells to date.

New interest in Lower Cretaceous exploration and potentialities was given an exciting boost toward the close of

O.K. BOYS BREAK IT UP!

Even after sedimentation, separation and chemical treatment of slop oils and refinery waste, you wind up with a knotty problem, that is, a highly stable interfacial emulsion. This is difficult to break, with too much oil in it to lose and too much contamination to allow discharge to waste. That's common knowledge.

But, today, a number of refineries have proved that this problem is easily solved by filtration with Dicalite Filter-aids. Dicalite breaks this tough emulsion in two ways. First, the fine solids that help to stabilize the emulsion are filtered out. Second, the oil and water globules are ruptured as they pass through the filter cake. The filter effluent readily separates into oil and water layers . . . the oil is, of course, already "upgraded" for easier reprocessing, the water is so free of oil (only 2 ppm were found in one State Waterways Authority check) that it may be discharged to waste without danger of stream pollution, or re-cycled for process water in some cases.

Dicalite filtration of refinery wastes recovers 5,300-5,900 bbl. of oil per month for one refinery, making it a highly profitable operation. Others report that oil recovery will pay for the entire filter installation in two years, and then probably show a profit.

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Georgia Legislature Considers $250,000 Bonus For First Oil Well
Copiah County Discovery Indicated Lower Cretaceous
New Stray Paluxy Sand Pay at Bolton
New Paluxy Pay at Soso
New Lower Cretaceous Field 6 Miles Northwest of Soso
Washita-Fredericksburg Production at Rank Hancock County Test
Citronelle-Lower Cretaceous

the year following two additional new-field discoveries. The first of these was at Citronelle, 25 miles north of Mobile, in northern Mobile County, southwestern Alabama, and the other near Ansley, in the southwest corner of Mississippi's coastal Hancock County, 25 miles southwest of Gulfport.

Citronelle's discovery well, drilled by Zach Brooks Drilling Co. and others, and completed last October, is oil productive from Rodessa sand at 10,900 ft. and the deeper Sligo zone at 11,050 ft. The better production is from the upper zone. The Sligo sand was tight and did not produce readily. However, at Mississippi's Soso field, where this sand has been the source of the field's most prolific production, the same situation existed in the early wells; as development spread, more porous and permeable conditions were encountered.

The discovery, Alabama's first Lower Cretaceous production and remote from nearest comparable production in Mississippi, occasioned a renewed, intensive lease play across northern Mobile County, spreading into adjacent counties, both in Alabama and southeastern Mississippi. Four offset tests, surrounding the discovery well, have reached the pay zones. Results of testing in three of them have been disappointing so far. One of the four offsets has not been tested. Two long-stepout wildcats drilled in the immediate area since the discovery, failed to find production. One was 2 miles east, and the other 5 miles southwest.

Mississippi's Hancock County discovery near Ansley was drilled by Marshall Young, of Jackson, on a Sun Oil Co. farmout. It is oil and gas productive from a 10,800-ft. sand in the Washita-Fredericksburg section in the upper part of the Lower Cretaceous. Except for two recently completed wells in Pistol Ridge field, 50 miles north, there is no other production from this horizon in the state. It is the first production in any of Mississippi's three coastal counties, and possibly opens a new province, on the coastal side of the Wiggins anticline, for exploration. Location is believed to be on a southwestern limb extension, or nosing off the anticline, a major geological feature extending east-west across the three coastal counties. It is only a short distance inland from the gulf, and less than 5 miles from the Louisiana line, 25 miles from New Orleans.

Testing was under way at the close of the year at two other prospective Lower Cretaceous discovery wells. Both are in Mississippi, one in the Taylorsville area, in southeastern Smith County, 6 miles northwest of Soso field, and the other 10 miles southwest of Hazlehurst, in southern Copiah County. The first, drilled by The California Co. to 13,105 ft. has been pumping a small amount of oil and some basic sediment and water from an 11,500-ft. sand. The other, drilled by Sun Oil Co. to 15,209 ft., is flowing a small volume of gas, condensate, and water while testing a 13,200-ft. sand. A 14,900-ft. sand previously was tested, also getting some gas and condensate.

Mississippi . . . Promising oil and gas showings were encountered in several other scattered Lower Cretaceous exploratory tests in southern Mississippi.

Sid Richardson drilled a deep exploratory test in Gwinville Eutaw-Tuscaloosa gas-condensate field, in Jefferson Davis Parish. From derrick-floor elevation of 529 ft., hole was carried to 18,629 ft., where bottom was in salt, topped at 18,250 ft. It penetrated the Jurassic-Cotton Valley formation below 15,500 ft. A fishing job prevented further drilling, and hole was plugged back and completed in a regular field sand at 8,150 ft.

Carter Oil Co. confirmed its 1954 discovery of deep Smackover gas-condensate production at Loring, in Madison County. Its second well, completed last October, also was productive of gas-condensate from the 12,000-ft. pay. This is the only Smackover production in the state. Only a few scattered tests have been drilled to the Smackover in the state.

Ten new Wilcox fields were discovered in southwestern Mississippi, all in Adams, Franklin, Jefferson, and Wilkinson counties. These, with a new Eutaw field, in Jones County, and the Hancock County Lower Cretaceous strike, constituted Mississipp's new-field discoveries of the year. The California Co. discovered another salt dome in Warren County, at Oak Ridge, 12 miles northeast of Vicksburg, but no production has been found. It drilled salt from 5,068 to 5,762 ft.

Alabama . . . Except for the Citronelle discovery and the subsequent lease activity through that area, Alabama was relatively quiet, 40 tests being drilled, compared with 56 the previous year.

Florida . . . Scattered deep wildcatting continued in the South Florida basin. Included in the deep drilling was Florida's first test offshore in the Gulf of Mexico. It was a Gulf Oil Corp. job, located 7 miles off East Cape at the mouth of Florida Bay between the mainland and the keys. Hole was quit at 12,631 ft.

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Ten-Year Record of Footage and Number Of Wells Completed in United States

Total Footage Drilled in United States by States and Years

(Thousands of feet)

	1946	1947	1948	1949	1950	1951	1952	1953	1954	1955
Arkansas	728	1,409	1,270	1,283	1,342	1,522	1,589	2,111	2,400	2,625
California	7,509	8,764	10,579	10,443	7,966	9,566	10,313	11,355	10,923	12,724
Colorado	1,063	1,151	1,228	359	409	1,425	2,580	3,830	7,412	8,103
Illinois	5,925	5,251	6,386	6,362	6,311	6,044	5,312	5,425	7,613	9,303
Indiana	1,071	1,206	2,023	2,357	2,642	2,455	2,255	2,102	1,380	1,103
Kansas	6,556	8,690	10,634	10,715	12,744	15,035	15,520	16,217	16,328	17,597
Kentucky	1,175	1,194	1,515	1,853	2,076	2,412	2,568	2,355	2,284	2,372
Louisiana	8,464	8,709	10,934	12,477	14,554	14,189	15,662	19,125	21,987	26,085
Northern	3,175	2,912	4,128	4,453	4,626	4,741	4,815	4,530	5,923	6,460
Southern	5,289	5,797	6,806	8,024	9,928	9,448	10,847	14,595	16,064	19,625
Michigan	1,749	1,935	1,983	2,209	2,118	1,860	1,808	1,603	1,542	1,522
Mississippi	1,971	4,131	3,312	2,388	2,258	2,539	2,441	2,750	3,162	3,339
Montana	661	630	819	650	621	640	1,257	1,933	1,473	1,928
New Mexico	1,624	2,512	2,602	2,419	2,747	3,777	5,833	8,017	6,161	7,046
N. Y., Pa., and W. Va.	9,985	9,702	9,293	5,835	5,381	5,800	6,512	5,662	6,691	3,993
North Dakota				24	27	65	1,002	1,962	2,246	1,774
Ohio	3,402	3,913	3,498	2,286	2,172	2,057	2,295	2,274	2,391	2,642
Oklahoma	9,771	12,151	15,515	15,339	19,865	20,542	21,621	26,122	29,463	27,532
Texas	34,352	41,029	52,746	57,462	71,975	76,777	82,451	78,645	85,185	85,984
North Central (7-B & 9)	7,065	8,544	11,312	12,831	14,513	16,017	18,688	21,958	22,484	22,982
West (7-C & 8)	8,815	10,809	15,428	16,398	26,543	28,233	29,389	20,318	25,144	26,560
Panhandle (10)	943	1,593	2,053	3,015	2,804	2,307	2,123	2,555	3,211	3,720
Eastern (5 & 6)	3,792	3,070	3,383	4,992	4,928	5,603	4,455	4,209	5,590	4,884
Gulf Coast (2 & 3)	11,599	9,559	11,995	11,880	13,706	14,328	16,968	16,361	17,245	16,034
Southwest (1 & 4)	2,138	7,454	8,575	8,346	9,481	10,289	10,828	13,244	11,511	11,804
South Dakota	16	8	4	11	30	3	48	103	108	64
Wyoming	716	1,203	2,501	2,803	2,994	3,789	3,529	4,337	6,537	4,484
Miscellaneous	318	473	550	728	1,056	1,834	2,594	2,911	3,700	6,046
Total United States	**97,056**	**114,061**	**137,392**	**138,003**	**159,288**	**172,331**	**187,190**	**198,839**	**218,986**	**226,270**

Total Completions in United States by States and Years

	1946	1947	1948	1949	1950	1951	1952	1953	1954	1955
Alabama	16	29	21	19	43	50	72	103	63	41
Arkansas	183	329	301	322	407	429	427	573	665	804
California	1,790	2,053	2,876	2,512	1,829	2,361	2,433	2,578	2,353	2,465
Colorado	167	209	207	82	99	289	486	734	1,358	1,509
Florida	28	35	26	24	13	2	10	30	31	30
Illinois	2,343	2,033	2,438	2,711	2,823	2,424	2,149	2,165	3,135	3,892
Indiana	582	681	1,082	1,279	1,534	1,369	1,277	1,280	887	706
Kansas	2,027	2,694	3,284	3,387	4,010	4,501	4,571	4,783	4,722	4,958
Kentucky	714	660	908	1,047	1,150	1,309	1,300	1,164	1,188	1,592
Louisiana	1,384	1,626	2,325	2,371	2,453	2,240	2,385	2,828	3,611	4,019
Michigan	788	909	895	995	897	746	707	623	567	512
Mississippi	260	491	428	334	313	375	348	397	441	448
Missouri	0	0	0	0	27	18	18	10	39	1
Montana	313	309	345	279	270	262	345	451	343	411
Nebraska	18	7	62	49	171	241	291	320	472	891
New Mexico	411	562	606	501	607	773	1,053	1,418	1,126	1,663
New York	1,544	1,531	1,344	882	657	627	767	696	435	378
North Dakota	0	0	0	0	3	13	122	270	312	250
Ohio	1,275	1,377	1,393	1,084	1,027	971	1,052	1,080	1,182	1,259
Oklahoma	3,050	3,846	4,293	4,352	5,459	5,626	5,781	7,593	8,786	8,411
Pennsylvania	3,584	3,238	3,159	1,920	1,581	1,738	1,884	1,507	1,331	717
South Dakota	9	3	0	0	12	0	14	20	23	16
Texas	7,804	9,301	12,251	13,665	16,585	16,655	16,845	17,019	18,865	19,981
Utah	4	4	18	49	17	39	79	70	91	92
West Virginia	755	882	846	518	652	622	606	618	614	640
Wyoming	168	267	584	587	615	745	700	917	1,221	915
Miscellaneous	11	46	86	69	25	91	99	32	69	81
Total United States	**29,228**	**33,122**	**39,778**	**39,038**	**43,279**	**44,516**	**45,821**	**49,279**	**53,930**	**56,682**

Wildcat Completions in United States by Years

	1946	1947	1948	1949	1950	1951	1952	1953	1954	1955
Alabama	11	23	19	14	20	21	40	75	56	40
Arkansas	50	65	97	78	100	99	97	140	157	210
California	260	359	492	487	450	551	597	666	572	530
Colorado	21	51	46	48	56	143	245	364	657	811
Florida	26	27	23	19	10	2	10	30	30	29
Illinois	635	521	622	724	810	873	656	425	461	635
Indiana	118	156	327	471	570	559	424	373	224	261
Kansas	307	412	510	522	816	1,006	845	887	811	1,018
Kentucky	107	93	139	169	214	293	306	213	173	399
Louisiana	254	278	310	281	302	379	401	513	570	695
North	114	136	119	106	136	210	195	177	214	242
South	140	142	191	175	166	169	206	336	356	453
Michigan	247	275	313	344	338	332	277	279	243	212
Mississippi	79	94	108	115	130	174	182	207	178	182
Montana	47	42	30	45	49	50	98	126	123	172
Nebraska	14	7	30	18	82	134	168	161	185	415
New Mexico	44	47	71	74	79	105	165	168	156	158
North Dakota	0	0	0	0	3	6	36	91	117	69
Ohio	64	51	52	37	19	35	41	22	22	27
Oklahoma	573	843	831	804	840	830	730	742	859	832
Pennsylvania	0	21	24	6	4	10	20	20	46	16
South Dakota	3	1	0	0	12	7	14	20	22	16
Texas	1,591	1,895	2,568	2,791	3,443	4,408	4,851	5,245	5,190	5,124
North Central (9)	550	330	429	475	607	862	1,048	1,058	1,131	975
West Central (7-B)	55	276	469	592	729	1,019	1,035	1,062	971	1,035
West (7-C & 8)	224	213	314	343	669	844	870	876	938	839
Panhandle (10)	5	15	15	19	24	36	80	26	94	65
East (5 & 6)	114	137	142	186	223	255	252	300	334	367
Gulf Coast (2)	300	380	500	450	480	299	336	369	312	344
Gulf Coast (3)	75	37	79	81	83	363	390	519	526	517
Southwest (1)	68	107	80	95	98	249	348	432	385	481
Southwest (4)	200	400	540	550	530	481	492	603	499	501
Utah	3	4	18	19	13	32	50	42	65	71
West Virginia	0	104	82	24	43	17	14	23	51	30
Wyoming	54	67	104	131	122	141	173	189	271	262
Miscellaneous	10	25	61	73	29	95	112	41	41	57
Total United States	**4,518**	**5,461**	**6,877**	**7,294**	**8,554**	**10,302**	**10,552**	**11,062**	**11,280**	**12,271**

Average Depth of All Wells Drilled

(Average in feet)

	1946	1947	1948	1949	1950	1951	1952	1953	1954	1955
Alabama	4,529	4,146	5,260	4,657	4,368	5,380	5,722	5,257	5,221	4,878
Arkansas	3,979	4,282	4,218	3,984	3,296	3,549	3,721	3,684	3,609	3,270
California	4,195	4,269	3,678	4,157	4,356	4,052	4,239	4,443	4,642	5,162
Colorado	6,316	5,507	5,932	4,378	4,132	4,929	5,309	5,218	5,458	5,370
Florida	6,368	6,182	5,939	7,529	5,893	10,047	6,256	6,517	6,406	6,638
Illinois	2,529	2,583	2,620	2,347	2,236	2,493	2,472	2,506	2,428	2,390
Indiana	1,839	1,771	1,870	1,843	1,722	1,793	1,766	1,642	1,556	1,563
Kansas	3,234	3,226	3,238	3,459	3,178	3,340	3,395	3,391	3,458	3,549
Kentucky	1,625	1,810	1,668	1,770	1,805	1,842	1,976	2,033	1,922	1,490
Louisiana	6,116	5,357	4,703	5,262	5,933	6,334	6,567	6,763	6,064	6,490
Michigan	2,219	2,129	2,215	2,220	2,362	2,494	2,557	2,573	2,720	2,973
Mississippi	7,581	8,416	7,738	7,150	7,214	6,771	7,013	6,926	7,170	7,453
Montana	2,111	2,038	2,375	2,328	2,301	2,443	3,643	4,287	4,295	4,691
Nebraska, Missouri	1,980	1,689	709	2,240	3,191	4,083	4,447	5,039	5,137	5,603
New Mexico	3,951	4,470	4,293	4,828	4,526	4,886	5,539	5,654	5,471	4,237
New York	1,433	1,439	1,438	1,434	1,437	1,440	1,369	1,447	1,446	1,460
North Dakota					9,038	5,425	8,213	7,267	7,200	7,096
Ohio	2,669	2,842	2,511	2,110	2,115	2,119	2,181	2,105	2,023	2,098
Oklahoma	3,204	3,159	3,614	3,525	3,639	3,651	3,740	3,440	3,553	3,273
Pennsylvania	1,613	1,578	1,636	1,605	1,717	1,800	1,971	1,977	3,273	2,534
Texas	4,402	4,411	4,305	4,205	4,340	4,601	4,301	4,626	4,516	4,303
Utah	2,139	6,713	4,140	5,001	4,069	5,473	6,395	5,653	4,139	4,314
West Virginia	2,735	2,707	2,592	2,873	2,643	2,844	2,887	2,310	2,776	2,505
Wyoming	4,261	4,506	4,282	4,775	4,869	5,086	5,042	4,730	5,354	4,901
Miscellaneous	3,125	2,884	1,986	1,933	3,221	3,035	3,624	2,886	2,966	3,078
Total United States	**3,321**	**3,445**	**3,454**	**3,538**	**3,680**	**3,871**	**4,085**	**4,035**	**4,061**	**3,992**

Summaries of Results

Exploratory and Development Drilling—1955

SOUTHWEST TEXAS
District 1
Wildcat Completions by Counties

	Oil	Gas	Dry	Total	Footage
Atascosa	21	0	72	93	341,821
Bandera	0	0	1	1	10,625
Bastrop	2	0	16	18	35,373
Bell	0	0	2	2	1,904
Bexar	2	0	20	22	41,951
Blanco	0	0	2	2	4,573
Burnet	0	0	1	1	4,790
Caldwell	1	0	24	25	64,444
Dimmit	3	0	27	30	110,497
Edwards	0	0	1	1	1,085
Frio	4	0	29	33	173,654
Gonzales	1	1	20	22	79,799
Guadalupe	4	0	34	38	79,560
Hays	1	0	1	2	4,524
Kendall	0	0	3	3	5,440
Kerr	0	0	2	2	7,931
Kimble	0	0	1	1	3,030
LaSalle	0	0	11	11	58,840
Mason	0	0	1	1	516
Maverick	1	0	7	8	30,941
McMullen	4	2	34	40	167,341
Medina	1	0	7	8	12,168
Milam	0	0	11	11	31,527
Travis	1	0	16	17	18,286
Uvalde	0	0	1	1	1,815
Val Verde	1	0	4	5	35,176
Williamson	0	0	6	6	9,695
Wilson	6	0	61	67	161,643
Zavalla	0	2	8	10	42,416
Total	*53	5	423	481	1,541,365

*Incl. 4 cond. wells.

SOUTHWEST TEXAS
District 1
Development Completions by Counties

	Oil	Gas	Dry	Total	Footage
Atascosa	260	0	37	297	1,162,674
Bastrop	4	0	3	7	15,464
Bexar	53	0	20	73	127,621
Caldwell	168	0	24	192	454,679
Dimmit	20	2	8	30	92,172
Frio	78	0	4	82	322,626
Gonzales	4	1	9	14	35,223
Guadalupe	236	0	34	270	429,538
LaSalle	52	1	12	65	46,926
McMullen	27	1	19	47	101,230
Medina	8	0	5	13	12,953
Milam	31	1	10	42	51,863
Travis	4	0	4	8	6,247
Val Verde	0	1	0	1	10,527
Williamson	0	0	2	2	1,846
Wilson	127	1	21	149	231,221
Zavalla	0	1	0	1	3,428
Total	*1,072	9	212	1,293	3,106,238

*Incl. 2 cond. wells.

TEXAS GULF COAST
District 2
Wildcat Completions by Counties

	Oil	Gas	Dry	Total	Footage
Bee	8	9	39	56	301,464
Calhoun	8	0	27	35	287,114
DeWitt	3	0	23	26	202,918
Goliad	6	1	19	26	168,480
Jackson	7	1	37	45	339,681
Karnes	3	0	23	26	164,513
Lavaca	4	0	7	11	91,416
Live Oak	6	2	50	58	283,703
Refugio	3	2	19	24	170,583
Victoria	9	5	23	37	241,538
Total	*57	20	267	344	2,251,410

*Incl. 22 cond. wells.

TEXAS GULF COAST
District 2
Development Completions by Counties

	Oil	Gas	Dry	Total	Footage
Bee	56	10	16	82	379,773
Calhoun	19	2	4	25	199,022
DeWitt	9	3	6	18	135,180
Goliad	31	9	17	57	370,423
Jackson	49	16	24	89	595,866
Karnes	18	1	8	27	117,345
Lavaca	7	1	2	10	86,826
Live Oak	31	2	24	57	294,770
Refugio	54	7	10	71	430,827
Victoria	20	14	9	43	237,365
Total	*294	65	120	479	2,847,397

*Incl. 27 cond. wells.

TEXAS GULF COAST
District 3
Wildcat Completions by Counties

	Oil	Gas	Dry	Total	Footage
Austin	1	0	3	4	40,747
Brazoria	10	1	47	58	500,229
Burleson	1	0	1	2	7,515
Chambers	1	1	20	22	213,509
Colorado	3	4	13	20	177,977
Fayette	0	0	6	6	20,533
Fort Bend	3	2	21	26	213,311
Galveston	11	2	8	21	202,900

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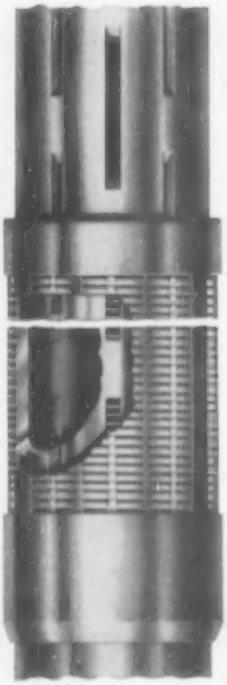

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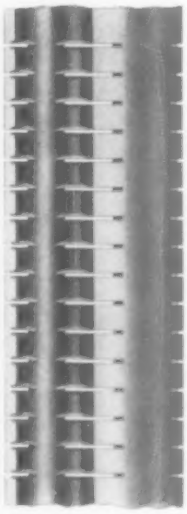

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Drilling by Counties

	Oil	Gas	Dry	Total	Footage
Grimes	0	0	1	1	3,000
Hardin	11	0	12	23	197,058
Harris	15	3	61	79	593,170
Jasper	1	0	8	9	69,245
Jefferson	10	1	24	35	307,998
Lee	0	0	2	2	7,140
Liberty	12	1	16	29	232,155
Madison	0	0	2	2	19,140
Matagorda	7	4	37	48	446,721
Montgomery	2	0	37	39	265,641
Newton	0	0	13	13	103,335
Orange	3	0	10	13	94,313
Polk	0	0	2	2	6,685
San Jacinto	0	0	7	7	54,116
Trinity	0	0	2	2	17,518
Tyler	0	0	3	3	18,068
Walker	0	0	3	3	23,637
Waller	1	0	5	6	38,915
Washington	0	0	1	1	5,955
Wharton	6	4	31	41	268,251
Total	*98	23	396	517	4,147,873

*Incl. 39 cond. wells.

TEXAS GULF COAST
District 3

Development Completions by Counties

	Oil	Gas	Dry	Total	Footage
Austin	17	0	4	21	130,176
Brazoria	82	2	47	131	745,611
Chambers	29	3	20	52	410,807
Colorado	12	5	8	25	217,744
Fayette	5	0	1	6	13,468
Fort Bend	20	2	15	37	256,568
Galveston	27	2	15	44	345,384
Hardin	115	1	22	138	633,045
Harris	166	2	51	219	1,077,899
Houston	2	0	0	2	18,469
Jasper	0	0	3	3	22,330
Jefferson	27	4	14	45	361,282
Lee	0	0	1	1	2,913
Liberty	128	3	36	167	1,087,126
Matagorda	28	9	21	58	315,998
Montgomery	35	3	16	54	306,152
Newton	11	0	7	18	140,499
Orange	47	1	6	54	292,465
Polk†	0	0	0	0	8,396
San Jacinto	0	0	1	1	10,730
Tyler	4	0	2	6	48,986
Waller	3	0	5	8	42,183
Washington	0	0	1	1	6,937
Wharton	32	14	29	75	291,922
Total	*790	51	‡325	1,166	6,787,090

*Incl. 61 cond. wells. †Incl. 3 service wells. ‡D.D.

SOUTHWEST TEXAS
District 4

Wildcat Completions by Counties

	Oil	Gas	Dry	Total	Footage
Aransas	4	1	17	22	188,568
Brooks	7	1	13	21	136,366
Cameron	0	1	5	6	60,053
Duval	12	2	64	78	349,999
Hidalgo	10	4	19	33	276,199
Jim Hogg	4	0	29	33	126,284
Jim Wells	7	5	30	42	235,284
Kenedy	2	0	9	11	117,860
Kleberg	3	2	1	6	54,592
Nueces	12	3	39	54	390,112
San Patricio	18	6	43	67	456,428
Starr	10	4	23	37	172,765
Webb	3	2	35	40	146,963
Willacy	6	0	4	10	83,604
Zapata	1	4	36	41	122,677
Total	*99	35	‡367	501	2,911,694

*Incl. 32 cond. wells. ‡Incl. 2 service wells.

SOUTHWEST TEXAS
District 4

Development Completions by Counties

	Oil	Gas	Dry	Total	Footage
Aransas	28	2	9	39	299,932
Brooks	13	2	8	23	136,519
Duval	85	5	30	120	440,384
Hidalgo	46	20	19	85	663,427
Jim Hogg	32	0	10	42	128,845
Jim Wells	32	10	23	65	363,315
Kenedy	4	0	1	5	42,927
Kleberg	14	3	6	23	185,421
Nueces	53	6	20	79	496,867
San Patricio	70	9	23	102	627,666
Starr	60	14	30	104	476,658
Webb	31	2	15	48	167,689
Willacy	10	0	2	12	95,363
Zapata	43	2	8	53	121,422
Total	*521	75	‡224	820	4,246,429

*Incl. 84 cond. wells. ‡Incl. 2 service wells.

EAST TEXAS
Districts 5 and 6

Wildcat Completions by Counties

	Oil	Gas	Dry	Total	Footage
Anderson	5	0	29	34	173,125
Angelina	0	1	1	2	18,691
Bosque	0	0	2	2	7,755
Bowie	0	0	5	5	31,429
Camp	0	0	2	2	17,261
Cass	3	0	8	11	61,556
Cherokee	1	2	47	50	276,019
Dallas	0	0	1	1	10,231
Ellis	0	0	2	2	2,557
Falls	0	0	3	3	7,923
Fannin	0	0	1	1	2,514
Franklin	0	0	2	2	15,213
Freestone	0	0	6	6	27,437
Gregg	3	1	5	9	52,713
Harrison	2	1	8	11	77,366
Henderson	3	0	21	24	147,681
Hill	0	0	3	3	3,670
Hopkins	0	0	3	3	16,269
Houston	0	0	8	8	59,137
Hunt	0	0	12	12	48,058
Johnson	0	0	2	2	12,530
Kaufman	0	0	23	23	100,154
Lamar	0	0	2	2	4,045
Leon	1	0	3	4	27,672
Limestone	1	2	10	13	57,935
McLennan	0	0	8	8	9,230
Marion	0	0	4	4	28,596
Nacogdoches	0	0	6	6	39,585
Navarro	1	0	19	20	56,190
Panola	4	1	3	8	47,679
Red River	2	0	4	6	10,354
Robertson	0	0	5	5	20,022
Rusk	1	2	7	10	60,371
Sabine	0	0	2	2	12,555
San Augustine	0	0	1	1	9,170
Shelby	1	0	5	6	32,415
Smith	2	1	18	21	111,213

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Drilling by Counties

	Oil	Gas	Dry	Total	Footage
Tarrant	0	0	2	2	9,299
Titus	0	0	2	2	9,954
Upshur	0	0	8	8	36,512
Van Zandt	0	0	8	8	38,674
Wood	0	0	15	15	91,963
Total	30	11	326	367	1,882,914

EAST TEXAS
Districts 5 and 6
Development Completions by Counties

	Oil	Gas	Dry	Total	Footage
Anderson	43	0	19	62	277,322
Angelina	0	1	1	2	18,881
Camp	3	0	2	5	19,624
Cass	41	1	2	44	277,670
Cherokee	60	1	13	74	359,772
East Texas field	16	0	2	18	65,830
Franklin	0	0	2	2	21,688
Freestone	1	4	8	13	67,322
Gregg	3	11	4	18	127,217
Harrison	65	26	22	113	581,061
Henderson	11	0	8	19	136,215
Hill	0	0	1	1	560
Hopkins	0	0	2	2	13,247
Houston	1	2	0	3	17,694
Kaufman	2	0	4	6	25,232
Leon	1	2	4	7	54,305
Limestone	3	1	4	8	24,923
Marion	21	0	1	22	113,269
McLennan	2	0	0	2	821
Navarro	11	1	18	30	54,344
Panola	55	27	17	99	472,324
Rusk	3	7	6	16	101,991
Shelby	0	0	3	3	11,893
Smith	7	0	3	10	59,275
Van Zandt	24	0	4	28	36,174
Wood	7	0	3	10	62,402
Total	*380	84	153	617	3,001,956

*Incl. 14 dist. wells

WEST CENTRAL TEXAS
(District 7-B)
Wildcat Completions by Counties

	Oil	Gas	Dry	Total	Footage
Brown	0	0	21	21	27,805
Callahan	17	0	196	213	524,179
Coleman	9	0	102	111	261,521
Comanche	0	0	7	7	23,277
Eastland	4	0	35	39	137,058
Erath	0	0	3	3	15,092
Fisher	16	0	44	60	263,560
Haskell	8	0	40	48	237,466
Jones	11	0	87	98	443,717
Mills	0	0	2	2	3,004
Nolan	15	0	57	72	448,135
Palo Pinto	0	1	26	27	63,782
Parker	1	0	3	4	15,136
San Saba	0	0	1	1	2,755
Shackelford	8	0	52	60	151,671
Stephens	12	0	36	48	176,893
Stonewall	15	0	40	55	335,373
Taylor	22	0	91	113	391,052
Throckmorton	9	0	44	53	222,093
Total	147	1	887	1,035	3,744,019

WEST CENTRAL TEXAS
(District 7-B)
Development Completions by Counties

	Oil	Gas	Dry	Total	Footage
Brown	58	2	18	78	114,134
Callahan	291	1	108	400	849,890
Coleman	99	2	60	161	358,940
Comanche	1	0	1	2	6,209
Eastland	58	0	25	83	150,659
Fisher	99	0	15	114	533,016
Haskell	51	0	19	70	303,910
Jones	89	0	39	128	461,797
Nolan	167	0	14	181	1,070,656
Palo Pinto	15	0	10	25	45,423
Parker	1	0	0	1	3,700
Shackelford	182	0	61	243	343,637
Stephens	111	0	26	137	396,536
Stonewall	142	0	29	171	888,386
Taylor	103	0	39	142	440,219
Throckmorton	52	0	18	70	269,920
Total	1,519	5	482	2,006	6,237,432

WEST TEXAS
(Districts 8 and 7-C)
Wildcat Completions by Counties

	Oil	Gas	Dry	Total	Footage
Andrews	12	0	25	37	284,513
Borden	4	0	10	14	117,838
Cochran	0	0	1	1	5,156
Coke	6	0	36	42	257,989
Concho	0	1	14	15	50,433
Cottle	1	0	7	8	38,575
Crane	12	0	13	25	153,246
Crockett	5	1	42	48	205,691
Crosby	1	0	1	2	7,927
Culberson	0	0	4	4	12,623
Dawson	1	0	13	14	111,573
Dickens	0	0	2	2	12,882
Ector	9	0	8	17	143,564
El Paso	0	0	1	1	1,597
Floyd	0	0	2	2	17,530
Gaines	7	0	25	32	321,039
Garza	8	0	23	31	123,514
Glasscock	1	0	5	6	26,356
Hockley	1	0	8	9	83,175
Howard	3	0	14	17	99,702
Hudspeth	0	0	2	2	998
Irion	5	0	7	12	77,491
Jeff Davis	0	0	1	1	10,950
Kent	2	0	15	17	114,855
Kimble	0	0	1	1	3,030
King	3	0	9	12	72,573
Lamb	0	0	3	3	19,412
Loving	1	0	8	9	41,817
Lubbock	0	0	1	1	10,751
Lynn	0	0	6	6	37,024
McCulloch	1	0	5	6	4,855
Martin	1	0	1	2	15,839
Menard	0	0	6	6	24,173
Midland	2	0	13	15	76,610
Mitchell	3	0	11	14	85,858
Motley	0	0	4	4	26,565
Pecos	9	1	30	40	166,071
Reagan	3	0	10	13	102,195
Reeves	1	0	16	17	70,023
Runnels	16	0	74	90	321,247
Schleicher	1	2	18	21	135,081
Scurry	12	0	22	34	205,647
Sterling	3	0	13	16	86,665
Sutton	0	6	12	18	107,469
Terrell	0	0	1	1	4,215
Terry	3	0	15	18	168,836
Tom Green	9	1	49	59	327,099

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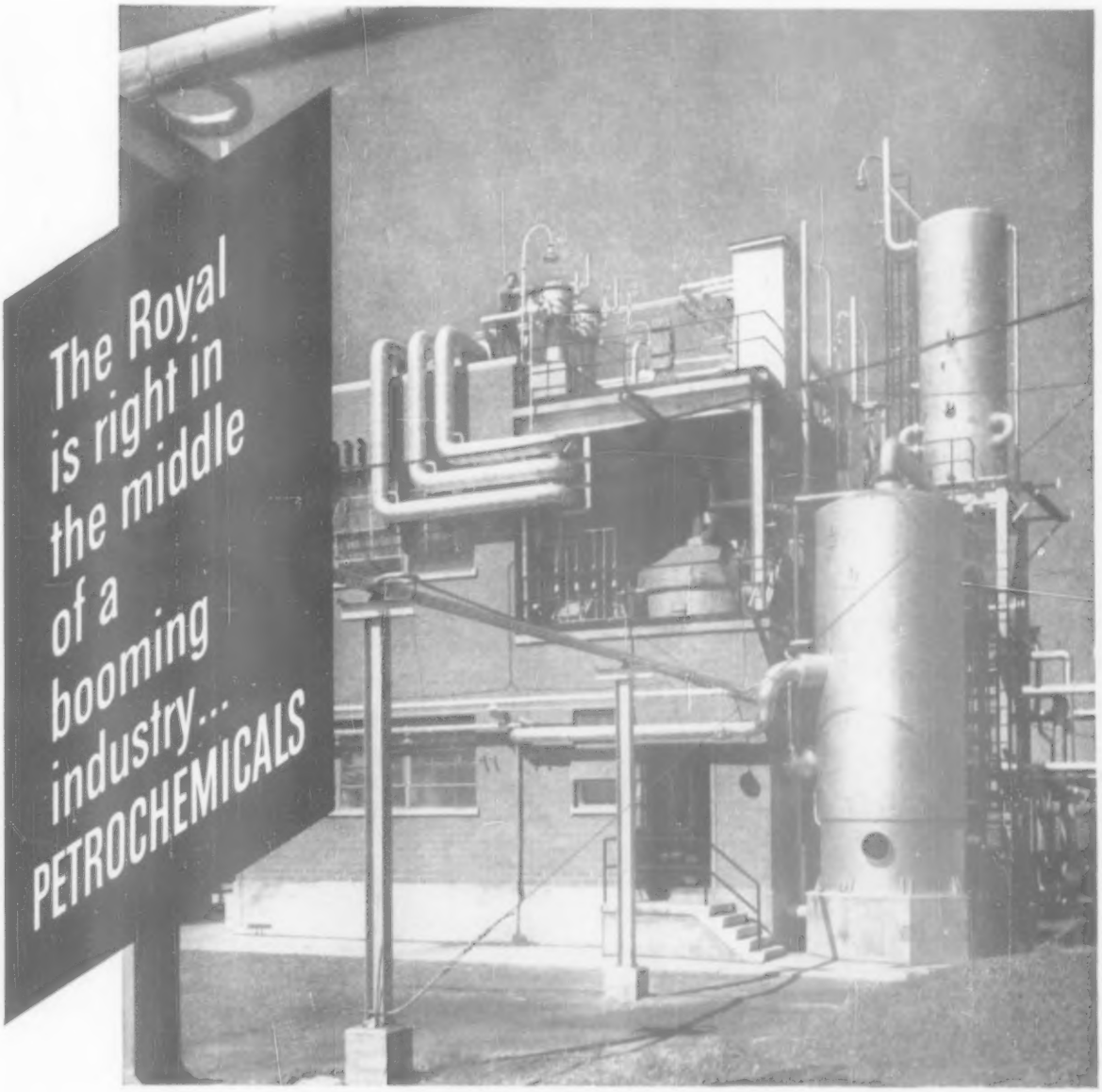

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Drilling by Counties

	Oil	Gas	Dry	Total	Footage
Upton	5	0	12	17	106,010
Ward	5	0	11	16	81,024
Winkler	1	0	6	7	64,094
Yoakum	5	0	28	33	232,035
Total	163	12	664	839	4,951,709

WEST TEXAS
(Districts 8 and 7-C)
Development Completions by Counties

	Oil	Gas	Dry	Total	Footage
Andrews	596	1	28	625	4,403,531
Borden	62	0	7	69	512,230
Cochran	35	0	0	35	174,927
Coke	175	0	6	181	1,164,143
Cottle	2	0	6	8	29,916
Crane	320	0	9	329	1,275,547
Crockett	117	10	26	153	413,864
Dawson	56	0	4	60	348,619
Ector	264	1	10	275	1,721,471
Gaines	129	1	6	136	1,221,658
Garza	138	0	15	153	503,157
Glasscock	30	0	1	31	191,962
Hockley	26	0	4	30	178,892
Howard	250	0	21	251	828,256
Irion	2	0	1	3	10,516
Kent	40	0	5	45	272,603
King	10	0	0	10	55,428
Lamb	14	0	0	14	58,071
Loving	19	0	2	21	87,588
Lubbock	3	0	2	5	21,873
Lynn	5	0	1	6	35,717
McCulloch	1	0	1	2	2,291
Menard	0	0	1	1	4,905
Midland	120	0	8	128	1,204,545
Mitchell	196	0	6	202	647,949
Pecos	123	6	26	155	344,372
Reagan	184	1	4	189	1,355,504
Reeves	13	2	3	18	85,500
Runnels	89	1	32	122	469,283
Schleicher	20	1	4	25	138,453
Scurry	142	0	6	148	680,629
Sterling	44	0	7	51	219,469
Sutton	0	1	2	3	11,827
Terry	53	0	7	60	459,190
Tom Green	48	0	10	58	244,391
Upton	79	0	6	85	668,137
Ward	197	0	8	205	612,855
Winkler	70	0	5	75	270,088
Yoakum	99	0	5	104	672,221
Total	3,749	25	†295	4,069	21,607,374

*Incl. 3 cond. wells. †Incl. 5 service wells.

NORTH TEXAS
(District 9)
Wildcat Completions by Counties

	Oil	Gas	Dry	Total	Footage
Archer	31	0	143	174	434,100
Baylor	7	0	70	77	193,219
Clay	25	0	62	87	404,390
Cooke	13	0	43	56	193,917
Denton	1	0	7	8	26,222
Foard	2	0	10	12	70,325
Grayson	36	0	47	83	667,919
Hardeman	1	0	3	4	27,304
Jack	16	7	65	88	350,642
Knox	0	0	15	15	70,682
Montague	12	0	30	42	235,158
Wichita	4	0	26	30	63,954
Wilbarger	11	0	88	99	294,741
Wise	17	8	12	37	187,200
Young	41	1	121	163	454,277
Total	217	16	742	975	3,674,050

NORTH TEXAS
(District 9)
Development Completions by Counties

	Oil	Gas	Dry	Total	Footage
Archer	344	0	225	569	986,185
Baylor	87	0	58	145	223,904
Clay	198	0	79	277	912,955
Cooke	126	0	39	165	434,489
Denton	3	0	2	5	8,855
Foard	7	0	3	10	45,651
Grayson	184	0	20	204	1,495,570
Jack	170	11	56	237	785,642
Knox	6	0	6	12	30,302
Montague	191	0	35	226	755,108
Wichita	496	0	136	632	1,332,371
Wilbarger	221	0	92	313	674,483
Wise	47	17	3	67	350,408
Young	303	2	170	555	1,290,469
Total	*2,463	30	†924	3,417	9,326,332

*Incl. 1 dist. †Incl. 1 service.

TEXAS PANHANDLE
(District 10)
Wildcat Completions by Counties

	Oil	Gas	Dry	Total	Footage
Carson	0	1	0	1	5,950
Collingsworth	1	0	1	2	4,085
Dallam	0	1	7	8	43,545
Gray	1	0	4	5	54,340
Hansford	7	5	7	19	143,994
Hartley	0	0	6	6	46,858
Hemphill	1	0	1	2	17,429
Hutchinson	2	0	1	3	16,313
Moore	1	0	0	1	3,510
Ochiltree	5	0	5	10	82,963
Potter	0	1	2	3	21,747
Randall	0	0	1	1	2,638
Roberts	1	1	1	3	25,441
Wheeler	0	0	1	1	3,510
Total	*19	9	37	65	472,323

*Incl. 7 dist.

TEXAS PANHANDLE
(District 10)
Development Completions by Counties

	Oil	Gas	Dry	Total	Footage
Carson	108	2	0	110	347,845
Collingsworth	0	6	0	6	12,018
Gray	164	24	12	200	604,863
Hansford	25	26	9	60	349,281
Hartley	2	2	4	8	46,254
Hemphill	0	0	1	1	11,200
Hutchinson	468	23	17	508	1,582,723
Moore	0	9	0	9	28,069
Ochiltree	2	0	0	2	16,005
Potter	1	21	3	25	73,574
Roberts	4	9	6	19	40,896
Sherman	2	14	1	17	54,295
Wheeler	29	0	5	34	80,455
Total	*805	127	58	990	3,247,478

*Incl. 15 dist.

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NORTH LOUISIANA
Wildcat Completions by Parishes

	Oil	Gas	Dry	Total	Footage
Bienville	2	0	7	9	54,456
Bossier	2	0	7	9	54,584
Caddo	2	0	13	15	67,911
Caldwell	0	0	8	8	41,764
Carroll, West	0	0	1	1	3,205
Carroll, East	0	0	1	1	2,460
Catahoula	4	0	15	19	111,232
Claiborne	6	1	7	14	109,290
Concordia	4	0	39	43	283,193
DeSoto	3	2	4	9	56,272
Franklin	2	1	2	5	25,827
Grant	0	0	3	3	9,542
Jackson	0	0	1	1	7,186
LaSalle	1	0	17	18	70,582
Lincoln	0	1	1	2	15,580
Madison	0	1	3	4	34,556
Morehouse	0	0	2	2	6,060
Natchitoches	0	0	10	10	49,742
Ouichita	1	1	5	7	57,326
Red River	0	0	2	2	9,890
Richland	0	1	6	7	24,711
Sabine	0	0	5	5	26,287
Tensas	5	0	6	11	84,674
Union	0	0	4	4	11,801
Webster	2	0	1	3	22,378
Winn	0	0	30	30	99,729
Total	*34	8	200	242	1,340,238

*Incl. 11 cond.

NORTH LOUISIANA
Development Completions by Parishes

	Oil	Gas	Dry	Total	Footage
Bienville	11	2	8	21	104,421
Bossier	86	7	21	114	319,064
Caddo	1,024	30	88	1,142	2,198,275
Carroll, West	0	10	3	13	28,052
Catahoula	7	0	8	15	91,006
Claiborne	26	5	12	41	262,767
Concordia	39	0	30	69	431,259
DeSoto	14	15	29	56	257,852
Franklin	14	0	14	28	145,223
Grant	8	0	8	16	35,213
LaSalle	31	1	12	44	120,563
Lincoln	1	5	5	11	96,320
Madison	0	1	1	2	12,481
Natchitoches	5	0	3	8	17,140
Ouachita	1	0	1	2	16,378
Red River	2	0	3	5	13,004
Richland	13	11	18	42	121,726
Sabine	11	2	5	18	54,587
Tensas	23	1	10	34	272,864
Union	7	56	3	66	143,821
Webster	38	6	10	54	339,096
Winn	22	0	6	28	39,223
Total	1,383	148	298	1,829	5,120,335

SOUTH LOUISIANA
Wildcat Completions by Parishes

	Oil	Gas	Dry	Total	Footage
Acadia	8	1	10	19	229,338
Allen	5	0	6	11	95,029
Ascension	1	0	5	6	63,730
Assumption	5	0	5	10	119,939
Avoyelles	1	0	4	5	38,900
Beauregard	4	1	12	17	150,660
Calcasieu	4	0	10	14	152,442
Cameron	12	4	26	42	510,541
E. Baton Rouge	1	0	4	5	53,245
East Feliciana	0	0	1	1	10,200
Evangeline	0	0	4	4	41,399
Iberia	5	0	4	9	112,148
Iberville	5	0	7	12	134,318
Jefferson	3	1	10	14	165,637
Jefferson Davis	8	1	8	17	190,119
Lafayette	4	0	1	5	63,323
Lafourche	24	4	25	53	663,809
Plaquemines	16	4	20	40	573,996
Pointe Coupe	1	0	4	5	57,295
Rapides	0	0	3	3	21,942
St. Bernard	2	0	8	10	97,303
St. Charles	4	0	4	8	103,295
St. Helena	0	0	1	1	13,487
St. James	2	0	2	4	56,667
St. John the Baptist	0	0	3	3	33,655
St. Landry	5	0	9	14	141,800
St. Martin	5	1	15	21	252,084
St. Mary	10	1	12	23	279,446
Terrebonne	15	5	22	42	520,466
Vermilion	11	2	10	23	290,093
W. Baton Rouge	0	0	3	6	30,208
Total	*161	25	267	453	5,257,514

*Incl. 71 cond. wells.

SOUTH LOUISIANA
Development Completions by Parishes

	Oil	Gas	Dry	Total	Footage
Acadia	47	6	31	84	848,202
Allen	35	1	5	41	360,575
Ascension	1	1	4	6	53,846
Assumption	12	3	7	22	250,853
Beauregard	36	1	13	50	434,225
Calcasieu	62	3	22	87	525,967
Cameron	42	3	26	71	651,972
E. Baton Rouge	5	0	1	6	61,541
Evangeline	7	0	2	9	83,937
Iberia	33	5	24	62	653,845
Iberville	31	3	13	47	425,344
Jefferson	31	4	28	63	664,035
Jefferson Davis	6	10	14	30	339,743
Lafayette	8	0	4	12	126,796
Lafourche	133	13	47	193	1,916,496
Plaquemines	235	8	45	288	2,712,087
Pointe Coupe	0	0	2	2	19,933
Rapides	0	0	1	1	5,712
St. Bernard	2	6	5	7	53,039
St. Charles	7	1	7	15	157,192

Drilling by Counties

	Oil	Gas	Dry	Total	Footage
St. James	3	0	3	6	63,022
St. Landry	33	2	16	51	359,774
St. Martin	30	4	20	54	465,716
St. Mary	67	10	19	96	972,269
Terrebonne	86	19	42	147	1,674,743
Vermilion	25	4	12	41	449,134
W. Baton Rouge	1	0	3	4	38,070
Total	*978	101	†416	1,493	14,367,268

*Incl. 197 cond. †Incl. 5 service wells.

ARKANSAS
Wildcat Completions by Counties

	Oil	Gas	Dry	Total	Footage
Bradley	0	0	9	9	18,014
Calhoun	0	0	6	6	22,664
Chicot	0	0	2	2	6,186
Cleveland	0	0	3	3	10,936

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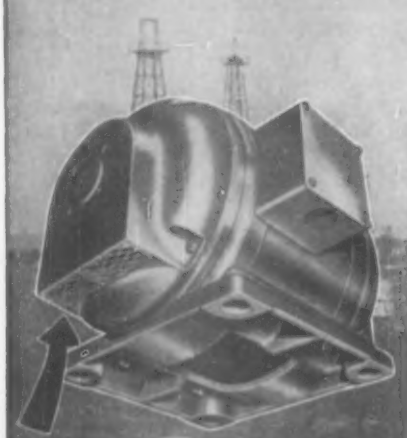

Screened Air Port Keeps Out Rodents!

Like a book, you can't tell a motor by its cover; it's what's **inside** that counts.

FIELDMASTER Ball Bearing Motors, for example, have been specially designed and built to more than handle the rugged requirements of oil field use. High slip is available to take care of reciprocating load requirements encountered in pumping . . . wide variety of windings provides triple ratings, dual voltages . . . high torque licks heavy starting problems . . . high-grade silicon steel in the magnetic circuit reduces iron losses . . . heavy-duty, double-shielded pre-lubricated bearings increase performance, reduce lubrication problems . . . heavy cast base assures alignment stability.

These are just a few of the many facts which prove FIELDMASTER Ball Bearing Motors are second to none. Our distributor, the Bethlehem Supply Company, will gladly supply you with **ALL** the facts . . . **without obligation.** May we have them contact you?

VALLEY ELECTRIC CORP. 4221 FOREST PARK BLVD., ST. LOUIS, MO.

Distributor, BETHLEHEM SUPPLY CO., TULSA, OKLA.

	Oil	Gas	Dry	Total	Footage
Columbia	2	0	14	16	87,561
Crawford	0	0	4	4	6,288
Drew	0	0	2	2	9,478
Franklin	0	1	2	3	10,950
Hempstead	0	0	2	2	4,872
Howard	0	0	4	4	7,878
Jefferson	0	0	1	1	4,520
Lafayette	6	0	27	33	123,760
Lincoln	0	0	2	2	8,065
Little River	0	0	2	2	8,160
Madison	0	0	3	3	3,890
Miller	9	0	14	23	107,285
Nevada	3	0	19	22	71,820
Ouachita	2	0	21	23	65,128
Pope	0	1	0	1	5,464
Randolph	0	0	1	1	650
Scott	0	0	1	1	3,250
Sebastian	0	1	0	1	5,115
Sevier	0	0	1	1	1,820
Union	14	1	28	43	179,481
Washington	0	0	1	1	1,175
White	0	0	1	1	521
Total	36	4	170	210	775,769

ARKANSAS
Development Completions by Counties

	Oil	Gas	Dry	Total	Footage
Bradley	1	0	1	2	9,268
Columbia	20	1	7	28	153,660
Franklin	0	3	2	5	19,175
Lafayette	48	0	39	87	310,622
Miller	17	0	20	37	169,095
Nevada	17	0	25	42	106,235
Ouachita	34	0	16	50	130,542
Union	256	2	85	343	954,518
Total	393	6	*195	594	1,853,115

*Incl 1 service well

KANSAS
Wildcat Completions by Counties

	Oil	Gas	Dry	Total	Footage
Barber	10	5	50	65	309,099
Barton	14	0	14	28	96,073
Brown	0	0	1	1	3,834
Butler	0	0	20	20	56,759
Chase	0	0	3	3	6,259
Chautauqua	0	0	1	1	2,483
Cheyenne	0	0	2	2	8,459
Clark	1	1	4	6	41,857
*Clay	0	0	1	1	2,070
Coffey	0	0	3	3	3,817
Comanche	1	0	8	9	46,485
Cowley	3	0	44	47	140,360
Decatur	2	0	9	11	44,656
Dickinson	1	0	19	20	51,921
Doniphan	0	0	2	2	4,224
Edwards	0	1	11	12	37,147
Elk	1	0	8	9	22,842
Ellis	6	0	30	36	132,410
Ellsworth	1	0	11	12	42,114
Finney	0	0	1	1	2,782
Ford	0	0	2	2	8,290
Gove	0	0	1	1	4,585
Graham	18	0	52	70	286,342
Grant	0	1	0	1	4,175
Greenwood	0	0	4	4	7,121
Hamilton	1	0	5	6	33,438
Harper	7	1	23	31	151,937
Harvey	0	0	7	7	24,790
Haskell	1	0	0	1	6,260
Hodgeman	0	0	6	6	28,316
Kingman	8	5	27	40	178,671
Kiowa	7	3	18	28	139,168
Logan	0	0	1	1	4,950
Lyon	0	0	11	11	25,855
McPherson	0	0	22	22	97,843
Marion	4	0	14	18	53,396
Meade	2	3	1	6	35,137
Morris	0	2	3	5	11,658
Morton	1	3	5	9	41,461
Ness	1	0	17	18	83,678
Norton	0	0	21	21	78,671
Osborne	0	0	8	8	32,778
Pawnee	7	5	50	62	270,556
Phillips	0	0	3	3	11,067
Pottawatomie	0	0	1	1	2,980
Pratt	4	1	19	24	110,405
Rawlins	0	0	2	2	9,402
Reno	4	0	28	32	121,886
Rice	2	1	11	14	48,630
Rooks	5	1	15	20	73,388
Rush	2	1	23	26	105,490
Russell	2	0	17	19	62,950
Saline	0	0	8	8	24,531
Scott	1	0	2	3	14,330
Sedgwick	6	0	55	61	211,140
Seward	0	1	3	4	24,521

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- WEAR
- CORROSION
- ELECTROLYTIC ACTION
- BALL POUNDING
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That's what you get with KENNAMETAL* Balls and Seats

You can reduce sub-surface pump failures and costly pump pulling jobs due to worn out balls and seats by installing Kennametal Balls and Seats. Kennametal gives you from 3 to 5 times longer service than special or super alloys and 20 times the service of steel balls and seats.

Get Performance Like This

- Kennametal wear parts in an Otis bottom hole regulator provided 12,000,000 closures under 1200 psi in sand-laden fluid.
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If you have a problem well, or just want longer life, less pump downtime, ask your pump service man to install Kennametal API Balls and Seats. They will cost you less in the long run. KENNAMETAL INC., Latrobe, Pennsylvania.

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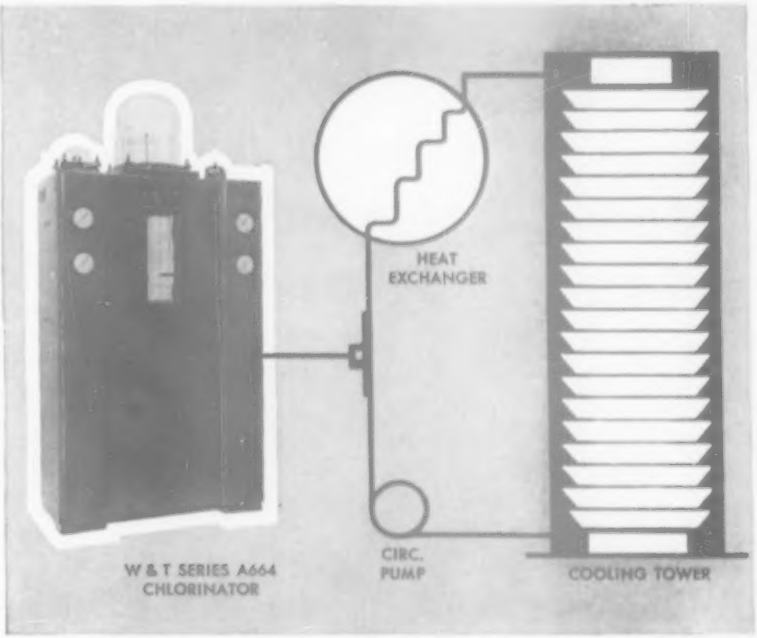
Longer pump life, less downtime, lower pump cost

Slime Control...



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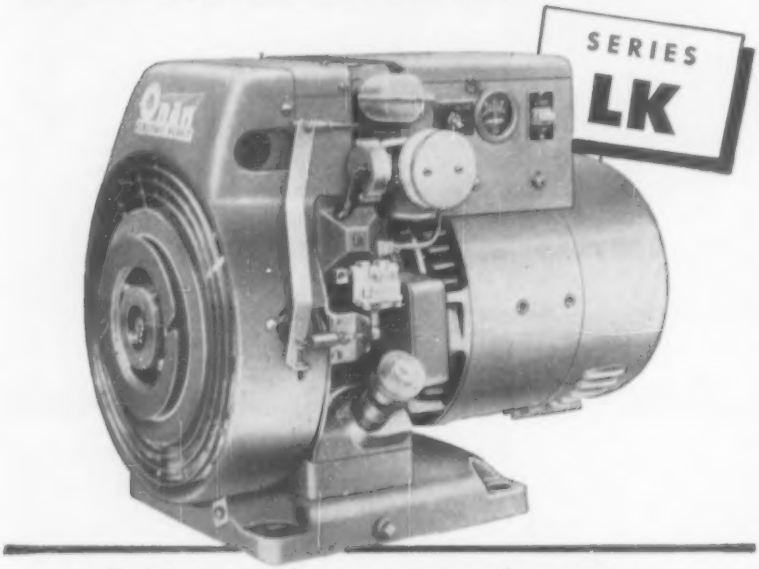

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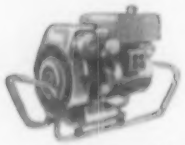

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Stands up better under rough handling. Carrying -frame or 2-wheel dolly optional.

PRIMARY POWER

Runs longer in continuous day-after-day service. Dependable, economical.

A dependable source of electricity for emergency standby use

Built to do the job where other units won't stand up! This new 2,000-watt, A.C., 115 or 230-volt, gasoline-driven Onan plant can take all kinds of punishment and come back for more. It's powered by a husky, Onan 4-cycle, single-cylinder, engine with Stellite-faced rotating exhaust valve, larger longer-wearing bearings, and efficient, trouble-free air-cooling. The Onan-built generator is direct-connected, permanently aligned, and fully-protected for use under all climatic conditions.

The Onan "LK" is compact too . . . requiring less than 3 square feet of floor space. Heavy-duty construction throughout . . . yet it weighs only 235 pounds. In carrying frame or dolly-mounted it can be taken anywhere and is easily moved around on the job.

The rating of 2,000 watts is conservative, allowing ample overload. Fuel consumption at full rated load is less than one quart of gasoline per kilowatt hour, making the "LK" a low-cost source of primary power. Recoil rope starter on models for portable use; electric starting available for stationary installations; automatic controls for emergency standby use.

Wide range of accessories available

Write today for special "LK" folder!

D. W. ONAN & SONS INC.

	Oil	Gas	Dry	Total	Footage
Sheridan	1	0	24	25	109,290
Sherman	0	0	1	1	5,531
Stafford	4	0	16	20	81,991
Stanton	0	0	6	6	33,658
Sumner	4	0	43	47	189,875
Thomas	0	0	3	3	14,783
Trego	2	0	23	25	108,182
Waubaunsee	0	0	2	2	6,381
Wallace	0	0	2	2	11,370
Woodson	1	0	2	3	5,132
Total	*135	34	849	1,018	4,053,837

*Incl 1 dist. well.

KANSAS
Development Completions by Counties

	Oil	Gas	Dry	Total	Footage
Allen	0	0	1	1	827
Barber	74	33	41	148	700,308
Barton	169	1	103	273	944,578
Butler	59	0	57	116	304,430
Chase	1	0	0	1	2,517
Chautauqua	19	0	10	29	49,871
Clark	20	0	6	26	143,777
Clay	0	0	2	2	4,746
Coffey	3	0	0	3	4,856
Cowley	186	1	97	284	818,371
Decatur	9	0	1	10	37,523
Dickinson	13	0	12	25	61,028
Edwards	4	0	2	6	27,100
Elk	8	0	7	15	38,097
Ellis	134	0	109	243	898,239
Ellsworth	23	0	27	50	168,573
Finney	1	49	5	55	147,739
Ford	0	0	1	1	5,060
Gove	1	0	3	4	18,126
Graham	176	0	80	256	1,005,881
Grant	0	2	0	2	5,233
Greenwood	112	0	52	164	343,959
Hamilton	0	0	3	3	16,034
Harper	61	5	12	78	332,850
Harvey	1	1	3	5	16,137
Haskell	5	41	4	50	151,696
Kearney	0	27	0	27	73,413
Kingman	56	5	24	85	357,094
Kiowa	5	4	8	17	83,261
Lyon	30	1	10	41	85,992
McPherson	88	0	44	132	390,053
Marion	61	0	35	96	240,961
Meade	6	0	6	12	69,498
Montgomery	2	0	11	13	19,904
Morris	9	0	3	12	36,108
Morton	18	109	10	137	490,789
Neosho	0	0	1	1	963
Ness	14	0	3	17	76,160
Norton	12	0	7	19	71,912
Pawnee	152	9	31	192	814,377
Phillips	5	0	3	8	28,544
Pratt	31	2	23	56	245,416
Renu	8	0	8	16	59,689
Rice	76	2	42	120	399,753
Rooks	104	0	76	180	661,597
Rush	17	0	13	30	114,913
Russell	88	1	46	135	432,931
Saline	8	0	7	15	47,933
Scott	1	0	0	1	4,685
Sedgwick	194	0	73	267	854,658
Seward	0	22	8	30	107,066
Sheridan	6	0	9	15	59,130
Stafford	81	0	66	147	564,797
Stanton	0	4	1	5	23,817
Stevens	0	8	0	8	21,843
Sumner	127	1	52	180	639,579
Trego	20	0	24	44	169,177
Woodson	21	0	11	32	50,169
Total	2,299	328	*1,313	3,940	1,151,393

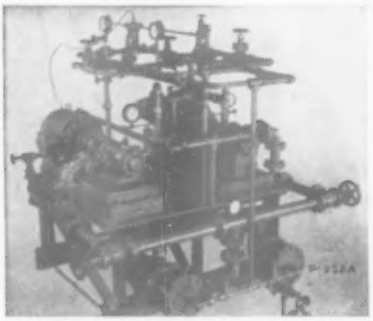
*Incl 12 service wells. †Incl. 3 dist. wells.

OKLAHOMA
Wildcat Completions by Counties

	Oil	Gas	Dry	Total	Footage
Alfalfa	2	0	6	8	43,829
Atoka	1	0	1	2	15,955
Beaver	7	8	15	30	224,405
Beckham	2	0	0	2	21,000
Bryan	0	0	11	11	45,688
Caddo	1	0	13	14	41,323
Carter	10	0	14	24	109,743
Cherokee	0	0	2	2	835
Choctaw	0	0	3	3	3,217
Cimarron	0	3	3	6	26,386
Cleveland	6	0	15	21	156,435
Coal	2	0	3	5	25,458
Comanche	2	1	19	22	22,641
Cotton	0	0	8	8	27,752
Craig	0	2	2	4	6,591
Creek	1	0	21	29	67,7[illegible]

COMPLETE RANGE OF SIZES AND MODELS IN BOTH MEDIUM AND HIGH PRESSURE TYPES

MORE COMPACT THAN EVER



P-952-A—Steam Turbine and Electric Motor drive gives flexibility in this compact Model P-ES2H size No. 25 unit.

NATIONAL AIROIL

FUEL OIL PUMPING AND HEATING UNITS

NATIONAL AIROIL Fuel Oil Pumping and Heating Units are specially designed to prepare, for combustion, all grades of fuel oil including No. 6 or Bunker "C" Oil and residuums. They will draw fuel oil from above ground or underground tanks, preheat it to proper constant temperature and deliver it to Oil Burners at an even pressure, best suited for the burners. Our Fuel Oil Pumping and Heating Units are the result of years of experience. They come completely equipped ready for steam, exhaust, condensate, oil suction, oil return and electrical connections. All valves, regulators, etc., are readily accessible. The piping arrangement is easily understood. These compact, space-saving units are available in a range of sizes and models in both Medium and High Pressure types. For complete details, write for our Bulletin 40 — very interesting and informative.

OIL BURNER and GAS BURNERS for industrial power, process and heating purposes
STEAM ATOMIZING OIL BURNERS
SLUDGE BURNERS, Steam Atomizing
MOTOR-DRIVEN ROTARY OIL BURNERS
MECHANICAL PRESSURE ATOMIZING OIL BURNERS
DUAL STAGE, Combining Steam and Mechanical Atomization
LOW PRESSURE OIL BURNERS
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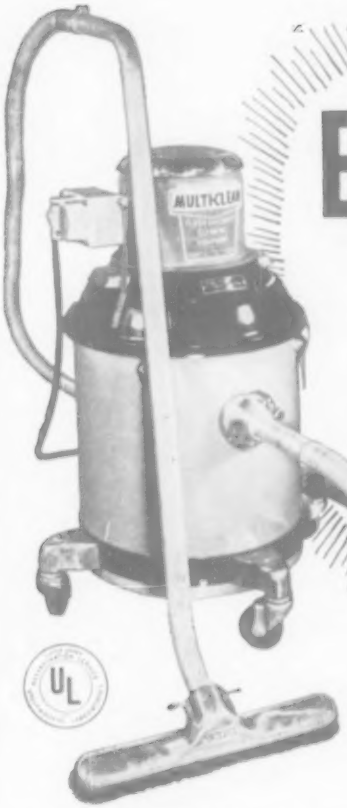
GAS BURNERS
COMBINATION GAS & OIL BURNERS
FUEL OIL PUMPING and HEATING UNITS
[illegible]
OBSERVATION PORTS
SPECIAL REFRACTORY SHAPES

NATIONAL AIROIL BURNER CO., INC.

1236 E. Sedgley Avenue, Philadelphia 34, Pa.
Southwestern Division



Explosion Proof Twins!

COMPLETELY Explosion-Proof!

Yes, this is the *first* industrial vacuum cleaner which combines portability, efficiency, and *complete safety.*

The MULTI-CLEAN H-500 EXPLOSION-PROOF Vac has been tested by UL and approved for use in Class I, Group D and Class 2, Group G locations.

This now means that you can use this wet-dry vac amid gases, vapors, dust, and in dozens of other situations where danger of explosion or fire had previously made use of a vac too risky.

It's ideal for cleaning floors, walls, overhead pipe, machinery or stock bins where there is grease, chemicals or other flammable materials. And since it works equally well for wet or dry pickup, it's just the thing for cleaning material from storage tanks.

Mills and elevators, chemical plants, petroleum refineries, gas plants, and distilleries are just a few of the locations where this new vac is especially suited.

For more information on the H-500, its powerful ¾ hp totally enclosed motor, its 100% bronze or aluminum construction, and its spark-proof electrical fittings . . . see your local MULTI-CLEAN Distributor or mail coupon below.

MULTI-CLEAN *Explosion-Proof* Machines are engineered for scrubbing, cleaning, buffing, and polishing in presence of combustible gases, liquids, dust. Available in 14" and 16" sizes.

Multi-Clean Explosion-Proof Floor Machine

The combination of the right Multi-Clean Equipment

MAIL COUPON TODAY!

MULTI-CLEAN PRODUCTS, INC., Dept. OG-16
9777 Ford Parkway, St. Paul 1, Minn.

Gentlemen: Send me complete information on the:
☐ Explosion-Proof Vacuum Cleaner
☐ Explosion-Proof Floor Machine

Name _____ Title _____
Firm _____
Address _____
City _____ Zone _____ State _____

We're Hard Headed about Quality

JEFFERSON

monoethanolamine, diethanolamine — for sweetening natural and refinery gas

diethylene glycol, triethylene glycol — for dehydrating natural gas

Shipped from convenient distribution points at Port Neches, Houston, Chicago, Los Angeles, and Tenafly, New Jersey—available in tank cars, tank wagons, or 55-gallon drums.

For prompt service, call your nearest Jefferson representative.

Jefferson Chemical Company, Inc., Box 303, Houston 1, Texas.

Essential Chemicals from Hydrocarbon Sources

Jefferson CHEMICAL COMPANY, INC.

HOUSTON • NEW YORK • CHICAGO • CHARLOTTE • LOS ANGELES

get ALL the facts and you'll choose FIELDMASTER BALL BEARING MOTORS

Like a book, you can't tell a motor by its cover; it's what's inside that counts.

FIELDMASTER Ball Bearing Motors, for example, have been specially designed and built to more than handle the rugged requirements of oil field use. High slip is available to take care of reciprocating load requirements encountered in pumping . . . wide variety of windings provides triple ratings, dual voltages . . . high torque licks heavy starting problems . . . high-grade silicon steel in the magnetic circuit reduces iron losses . . . heavy-duty, double-shielded pre-lubricated bearings increase performance, reduce lubrication problems . . . heavy cast base assures alignment stability.

These are just a few of the many facts which prove FIELDMASTER Ball Bearing Motors are second to none. Our distributor, the Bethlehem Supply Company, will gladly supply you with ALL the facts . . . without obligation. May we have them contact you?

VALLEY ELECTRIC CORP. 4221 FOREST PARK BLVD., ST. LOUIS, MO.

Distributor, BETHLEHEM SUPPLY CO., TULSA, OKLA.

Crawford	0	0	4	4	6,356
Drew	0	0	2	2	9,478
[illegible]	0	4	5	9	[illegible]
Hempstead	0	0	2	2	4,872
Howard	0	0	4	4	7,878
Jefferson	0	0	1	1	4,520
Lafayette	6	0	27	33	123,760
Lincoln	0	0	2	2	8,665
Little River	0	0	2	2	8,160
Madison	0	0	3	3	3,890
Miller	9	0	14	23	107,285
Nevada	3	0	19	22	71,820
Ouachita	2	0	21	23	65,128
Pope	0	1	0	1	5,464
Randolph	0	0	1	1	650
Scott	0	0	1	1	3,250
Sebastian	0	1	0	1	5,115
Sevier	0	0	1	1	1,820
Union	14	1	28	43	179,481
Washington	0	0	1	1	1,175
White	0	0	1	1	521
Total	36	4	170	210	775,769

ARKANSAS

Development Completions by Counties

	Oil	Gas	Dry	Total	Footage
Bradley	1	0	1	2	9,268
Columbia	20	1	7	28	153,660
Franklin	0	3	2	5	19,175
Lafayette	48	0	39	87	310,622
Miller	17	0	20	37	169,095
Nevada	17	0	25	42	106,235
Ouachita	34	0	16	50	130,542
Union	256	2	85	343	954,548
Total	393	6	*195	594	1,853,145

*Incl 1 service well.

KANSAS

Wildcat Completions by Counties

	Oil	Gas	Dry	Total	Footage
Barber	10	5	50	65	309,099
Barton	14	0	14	28	96,073
Brown	0	0	1	1	3,834
Butler	0	0	20	20	56,759
Chase	0	0	3	3	6,259
Chautauqua	0	0	1	1	2,483
Cheyenne	0	0	2	2	8,459
Clark	1	1	4	6	41,857
*Clay	0	0	1	1	2,070
Coffey	0	0	3	3	3,817
Comanche	1	0	8	9	46,485
Cowley	3	0	44	47	160,560
Decatur	2	0	9	11	44,656
Dickinson	1	0	19	20	51,921
Doniphan	0	0	2	2	4,224
Edwards	0	1	11	12	57,147
Elk	1	0	8	9	22,842
Ellis	6	0	30	36	132,410
Ellsworth	1	0	11	12	42,114
Finney	0	0	1	1	2,782
Ford	0	0	2	2	8,290
Gove	0	0	1	1	4,585
Graham	18	0	52	70	286,342
Grant	0	1	0	1	4,175
Greenwood	0	0	4	4	7,121
Hamilton	1	0	5	6	33,438
Harper	7	1	23	31	131,937
Harvey	0	0	7	7	24,790
Haskell	1	0	0	1	6,260
Hodgeman	0	0	6	6	28,316
Kingman	8	5	27	40	178,671
Kiowa	7	3	18	28	139,168
Logan	0	0	1	1	4,950
Lyon	0	0	11	11	25,855
McPherson	0	0	22	22	97,843
Marion	4	0	14	18	53,396
Meade	2	3	1	6	35,137
Morris	0	2	3	5	11,658
Morton	1	3	5	9	41,461
Ness	1	0	17	18	83,678
Norton	0	0	21	21	78,671
Osborne	0	0	8	8	32,778
Pawnee	7	5	50	62	270,556
Phillips	0	0	3	3	11,067
Pottawatomie	0	0	1	1	2,980
Pratt	4	1	19	24	110,405
Rawlins	0	0	2	2	9,402
Reno	4	0	28	32	121,886
Rice	2	1	11	14	48,630
Rooks	5	1	15	20	73,388
Rush	2	1	23	26	105,490
Russell	2	0	17	19	62,950
Saline	0	0	8	8	24,531
Scott	1	0	2	3	14,330
Sedgwick	6	0	55	61	211,140
Seward	0	1	3	4	24,521

EXCEPTIONALLY HIGH RESISTANCE TO

- FLUID CUTTING
- WEAR
- CORROSION
- ELECTROLYTIC ACTION
- BALL POUNDING
- BALL-ON-SEAT SHOCK

That's what you get with KENNAMETAL* Balls and Seats

You can reduce sub-surface pump failures and costly pump pulling jobs due to worn out balls and seats by installing Kennametal Balls and Seats. Kennametal gives you from 3 to 5 times longer service than special or super alloys and 20 times the service of steel balls and seats.

Get Performance Like This

- Kennametal wear parts in an Otis bottom hole regulator provided 12,000,000 closures under 1200 psi in sand-laden fluid.
- After over 2 years of service, Kennametal Balls and Seats are still operating in a Houston field, where the corrosive and abrasive conditions forced pump surfacing 3 times in 4 months to replace alloy balls and seats.
- In a Ventura Avenue well, strongly corrosive cuts destroyed the effectiveness of the best alloy steel balls and seats in three weeks' service. Kennametal Balls and Seats were installed over a year and a half ago. Already they have outlasted the best alloy steels by 26 to 1, and they're still on the job.

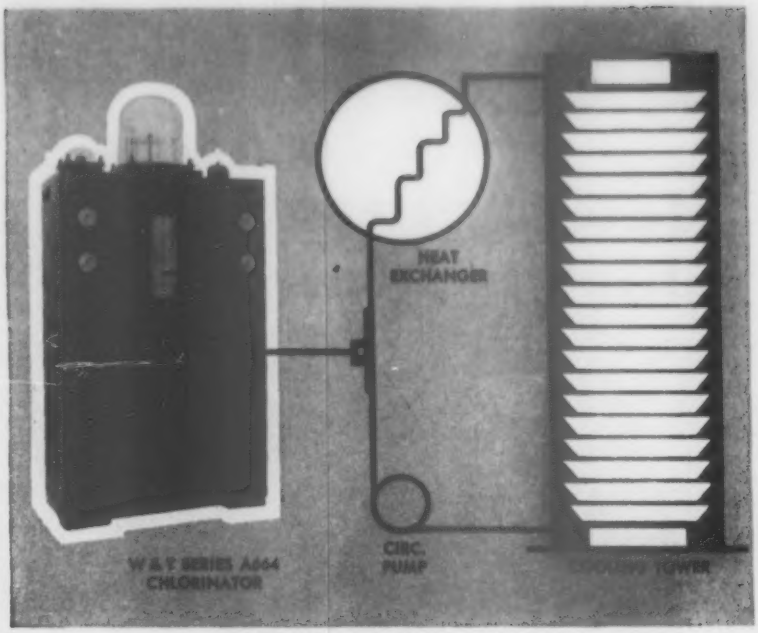
If you have a problem well, or just want longer life, less pump downtime, ask your pump service man to install Kennametal API Balls and Seats. They will cost you less in the long run. KENNAMETAL INC., Latrobe, Pennsylvania.

*Registered Trademark 7283

INDUSTRY AND KENNAMETAL ...Partners in Progress

Longer pump life, less downtime, lower pump cost

Slime Control . . .



...Chlorination of Cooling Water Circuits

Heat transfer losses caused by slime formation on condenser and heat exchanger water-side surfaces can be eliminated by chlorination of the cooling water. Water and air-borne organisms—the cause of slime formations—are effectively and economically controlled by Wallace and Tiernan chlorination systems.

The Wallace and Tiernan Series A-664 Chlorinator shown above is one of a complete line of W&T chlorination equipment, designed to give dependable chlorination at all feed ranges. It is used at large plants where cooling water chlorine requirements call for a durable high capacity unit.

We Invite Your Inquiries

Technical information on cooling water chlorination is available in our free booklet, RA-2061-C. Bulletins on chlorination of industrial process water and industrial waste treatment are also available. Write us for your copy.

WALLACE & TIERNAN INCORPORATED

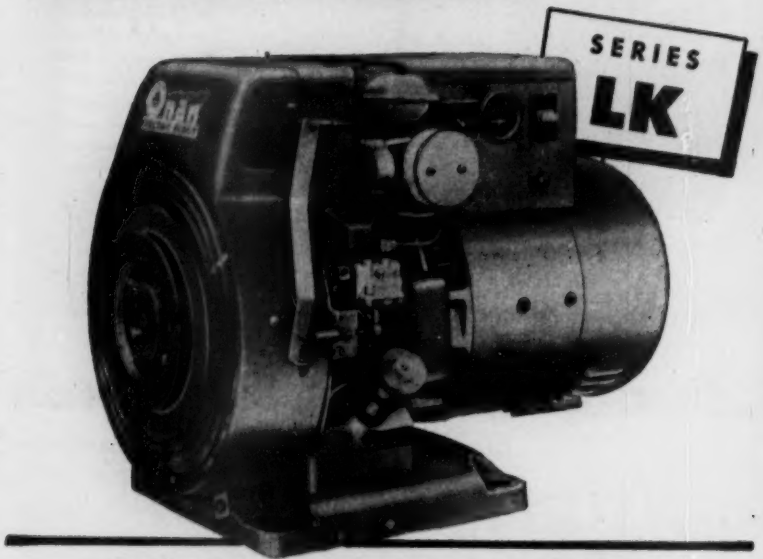
25 MAIN STREET, BELLEVILLE 9, NEW JERSEY

CD-40

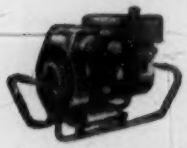
RUGGED

is the word for this

New ONAN 2-KW Electric Plant



Put it to work on your toughest jobs!



PORTABLE POWER

Stands up better under rough handling. Carrying -frame or 2-wheel dolly optional.

PRIMARY POWER

Runs longer in continuous day-after-day service. Dependable, economical.

A dependable source of electricity for emergency standby use

Built to do the job where other units won't stand up! This new 2,000-watt, A.C., 115 or 230-volt, gasoline-driven Onan plant can take all kinds of punishment and come back for more. It's powered by a husky, Onan 4-cycle, single-cylinder, engine with Stellite-faced rotating exhaust valve, larger longer-wearing bearings, and efficient, trouble-free air-cooling. The Onan-built generator is direct-connected, permanently aligned, and fully-protected for use under all climatic conditions.

The Onan "LK" is compact too . . . requiring less than 3 square feet of floor space. Heavy-duty construction throughout . . . yet it weighs only 235 pounds. In carrying frame or dolly-mounted it can be taken anywhere and is easily moved around on the job.

The rating of 2,000 watts is conservative, allowing ample overload. Fuel consumption at full rated load is less than one quart of gasoline per kilowatt hour, making the "LK" a low-cost source of primary power. Recoil rope starter on models for portable use; electric starting available for stationary installations; automatic controls for emergency standby use.

Wide range of accessories available

Write today for special "LK" folder!

D. W. ONAN & SONS INC.

Onan ELECTRIC PLANTS

3560 UNIVERSITY AVE. S.E. • MINNEAPOLIS 14, MINNESOTA

	Oil	Gas	Dry	Total	Footage
Sheridan	1	0	24	25	109,290
Sherman	0	0	1	1	5,531
Stafford	4	0	16	20	81,991
Stanton	0	0	6	6	33,656
Sumner	4	6	43	47	189,875
Thomas	0	0	3	3	14,780
Trego	2	0	23	25	106,182
Waubaunsee	0	0	2	2	6,381
Wallace	0	0	2	2	11,370
Woodson	1	0	2	3	5,132
Total	*135	34	849	1,018	4,033,837

*Incl 1 dist. well.

KANSAS

Development Completions by Counties

	Oil	Gas	Dry	Total	Footage
Allen	0	0	1	1	827
Barber	74	33	41	148	700,306
Barton	169	1	103	273	944,578
Butler	59	0	57	116	304,430
Chase	1	0	0	1	2,517
Chautauqua	19	0	10	29	49,871
Clark	20	0	6	26	143,777
Clay	0	0	2	2	4,746
Coffey	3	0	0	3	4,858
Cowley	186	1	97	284	818,371
Decatur	9	0	1	10	37,523
Dickinson	13	0	12	25	61,028
Edwards	4	0	2	6	27,100
Elk	8	0	7	15	38,097
Ellis	134	0	109	243	898,239
Ellsworth	23	0	27	50	168,573
Finney	1	49	5	55	147,739
Ford	0	0	1	1	5,060
Gove	1	0	3	4	18,126
Graham	176	0	80	256	1,005,881
Grant	0	2	0	2	5,233
Greenwood	112	0	52	164	343,959
Hamilton	0	0	3	3	16,034
Harper	61	5	12	78	332,850
Harvey	1	1	3	5	16,137
Haskell	9	41	4	50	151,696
Kearney	0	27	0	27	73,413
Kingman	56	5	24	85	357,094
Kiowa	5	4	8	17	83,261
Lyon	30	1	10	41	85,992
McPherson	88	0	44	132	390,053
Marion	61	0	35	96	240,961
Meade	6	0	6	12	69,498
Montgomery	2	0	11	13	19,904
Morris	9	0	3	12	36,108
Morton	18	109	10	137	490,789
Neosho	0	0	1	1	963
Ness	14	0	3	17	76,160
Norton	12	0	7	19	71,912
Pawnee	152	9	31	192	814,377
Phillips	5	0	3	8	28,544
Pratt	31	2	23	56	245,416
Reno	8	0	8	16	59,089
Rice	76	2	42	120	399,753
Rooks	104	0	76	180	661,597
Rush	17	0	13	30	114,913
Russell	88	1	46	135	432,931
Saline	8	0	7	15	47,933
Scott	1	0	0	1	4,685
Sedgwick	194	0	73	267	854,658
Seward	0	22	8	30	107,068
Sheridan	6	0	9	15	59,130
Stafford	61	0	86	147	564,797
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Coal	2	0	3	5	25,458
Comanche	2	1	19	22	22,641
Cotton	0	0	8	8	27,752
Craig	0	2	2	4	6,394
Creek	2	0	24	26	52,883
Custer	0	0	1	1	11,672

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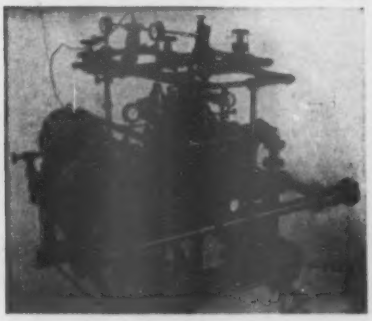

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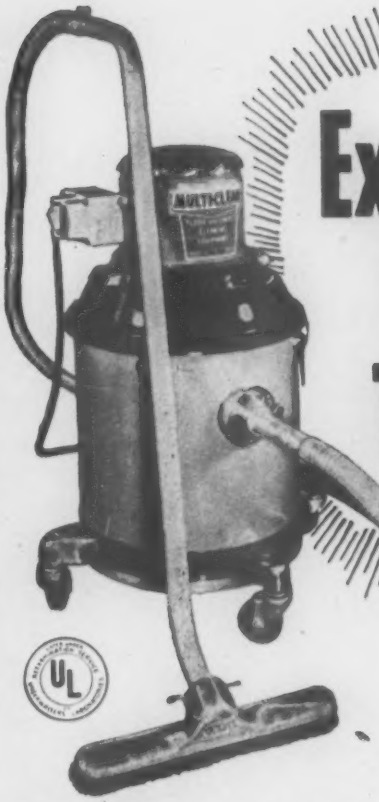
COMBINATION GAS & OIL BURNERS
FUEL OIL PUMPING and HEATING UNITS
FURNACE RELIEF DOORS
OBSERVATION PORTS
SPECIAL REFRACTORY SHAPES

NATIONAL AIROIL BURNER CO., INC.

1236 E. Sedgley Avenue, Philadelphia 34, Pa.
Southwestern Division:
2512 South Boulevard, Houston 6, Texas



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Multi-Clean Explosion-Proof Floor Machine

MAIL COUPON TODAY!

MULTI-CLEAN PRODUCTS, INC., Dept. OG-16
2277 Ford Parkway, St. Paul 1, Minn.

Gentlemen: Send me complete information on the:

☐ Explosion-Proof Vacuum Cleaner
☐ Explosion-Proof Floor Machines

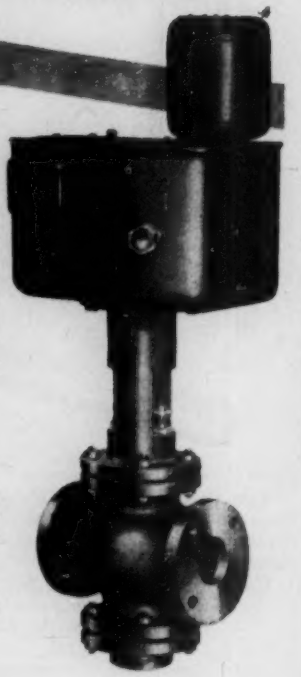
Name _____ Title _____

Firm _____

Address _____

City _____ Zone _____ State _____

FOUND: the MISSING LINK in electronic control... the electro-hydraulic FINAL CONTROL element



NEW ASKANIA ELECTRO-HYDRAULIC VALVE ACTUATOR IS CONTINUOUS-ACTING, DEPENDABLE

• Here's a new valve actuator which makes remote *electrical operation of the final control element* a reality for the first time. Adaptable to practically all electronic controllers, it produces an accurate, dependable heavy duty action capable of delivering a 600 lb. thrust to slide stem valves up to 8 inch size. Relays and positioners are eliminated because the actuator connects directly to the controller.

SIMPLE OPERATION... EASY MAINTENANCE

• Operation of the Askania **"EHVA"** is automatic. Maintenance is less because there are no compressors, dehumidifiers, filters or piping to create trouble.

Trouble sources are greatly minimized... failures seldom encountered...easy to locate and rectify.

ELIMINATES WEATHER FACTOR

• Electrical operation means no inconvenience or failure from condensation or freezing. Trouble free operation under any conditions... indoors or out, winter or summer...is assured—*all the way to the final control element* with Askania's Electro-Hydraulic Valve Actuator.

Check These Facts: Permits all Electric Control Throughout the System • Weatherproof Performance • Simple to Install—and Operate • Continuously responsive to small signal changes • Accurate Valve Positioning Assured by Force Balance Principle.

FEATURES:

Valve Stem Speed...0.5 in/sec Valve Stem Thrust...600 lbs.
Valve Stem Stroke.....½ to 2 inches
Input Coil Resistance.....3,000-18,000 ohms
Input Signal.....approx. 75 milliwatts d.c.

Write **for Bulletin No. 200 for complete information on how "EHVA" control might be adapted to your control system.**

CONTROLS FOR INDUSTRY

ASKANIA REGULATOR COMPANY

290 East Ontario Street, Chicago, Illinois

HYDRAULIC, ELECTRONIC CONTROLS & SERVOS, GENERAL SYSTEMS, ENGINEERING & COMPUTER SERVICE, VALVE ACTUATORS & CYLINDERS

A Subsidiary of General Precision Equipment Corporation

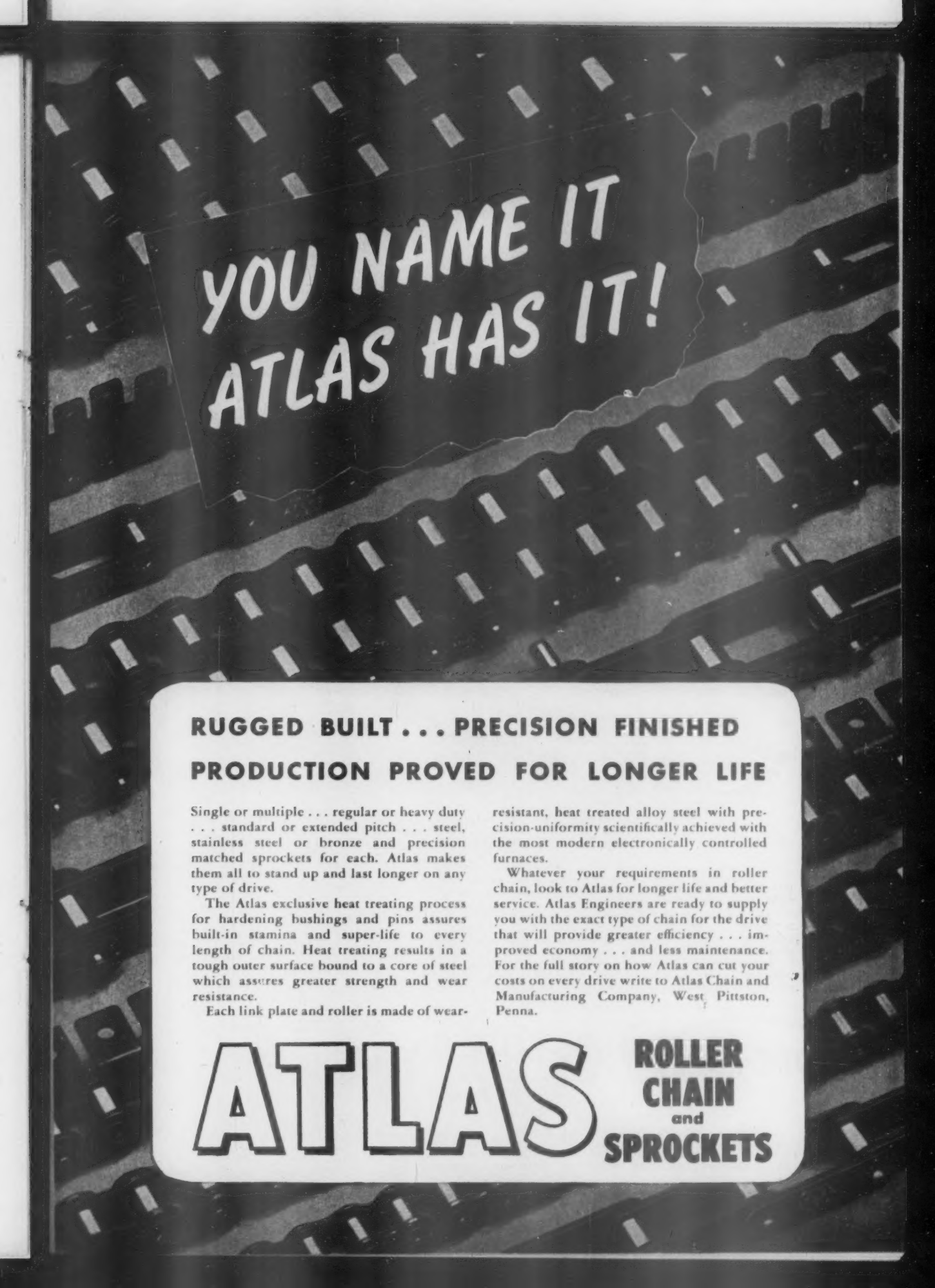
	Oil	Gas	Dry	Total	Footage
Delaware	0	0	2	2	716
Garfield	1	0	15	16	58,317
Garvin	18	0	18	36	223,610
Grady	6	0	19	25	179,098
Grant	3	0	9	12	62,710
Greer	1	0	18	19	23,379
Harmon	0	0	5	5	29,463
Harper	1	0	1	2	13,843
Haskell	0	2	2	4	24,285
Hughes	4	3	13	20	61,586
Jackson	1	0	3	4	16,315
Jefferson	2	0	12	14	34,597
Johnston	0	0	1	1	1,497
Kay	3	0	18	21	90,820
Kiowa	1	0	13	14	21,809
Leflore	0	1	1	2	8,990
Lincoln	8	4	48	60	250,655
Logan	6	0	20	26	156,706
Love	0	0	6	6	35,224
McClain	2	0	6	8	58,932
McCurtain	0	0	7	7	10,226
McIntosh	0	0	6	6	18,462
Major	0	0	1	1	9,475
Marshall	4	0	4	8	52,832
Mayes	0	0	5	5	5,633
Murray	2	0	6	8	41,988
Muskogee	0	0	3	3	8,658
Noble	5	0	31	36	147,231
Nowata	4	1	1	6	6,525
Oklahoma	4	0	5	9	53,082
Okfuskee	1	0	10	11	35,766
Okmulgee	1	0	1	2	5,904
Osage	8	0	47	55	226,811
Ottawa	0	1	3	4	1,529
Pawnee	6	1	23	30	94,381
Payne	3	0	23	26	114,317
Pittsburg	0	0	3	3	24,152
Pontotoc	3	1	9	13	29,796
Pottawatomie	3	0	9	12	65,383
Roger Mills	0	0	3	3	19,500
Rogers	3	0	12	15	12,516
Seminole	3	0	1	4	17,090
Sequoyah	0	0	4	4	8,407
Stephens	4	0	19	23	114,313
Texas	1	3	5	9	57,444
Tillman	2	0	21	23	103,660
Wagoner	3	0	5	8	7,940
Washington	1	0	0	1	1,519
Washita	0	0	3	3	14,022
Woods	1	0	0	1	8,130
Woodward	0	0	1	1	8,412
Total	*154	31	647	832	3,515,175

*Incl 18 cond. wells.

OKLAHOMA

Development Completions by Counties

	Oil	Gas	Dry	Total	Footage
Alfalfa	3	0	0	3	15,047
Atoka	6	0	0	6	2,831
Beaver	13	15	7	35	233,380
Beckham	2	1	4	7	7,974
Bryan	1	0	1	2	5,258
Caddo	194	9	38	241	613,097
Carter	324	4	81	409	1,668,373
Cimarron	0	16	2	18	86,031
Cleveland	86	0	15	101	759,428
Coal	3	0	3	6	25,115
Comanche	70	1	55	126	113,203
Cotton	28	2	22	52	105,776
Creek	467	15	244	726	1,758,388
Garfield	99	1	39	139	395,032
Garvin	416	12	108	536	3,175,551
Grady	175	19	46	240	1,398,189
Grant	9	0	13	22	108,334
Greer	14	3	31	48	43,454
Hughes	159	59	69	287	756,054
Jackson	9	1	6	16	28,688
Jefferson	38	0	38	76	159,957
Kay	92	6	55	153	538,440
Kingfisher	2	0	3	5	38,144
Kiowa	10	2	22	34	46,217
Leflore	0	1	0	1	6,590
Lincoln	254	21	117	392	1,415,146
Logan	65	1	39	105	570,234
Love	13	0	5	18	89,550
McClain	15	0	5	20	211,533
McCurtain	0	0	4	4	2,349
McIntosh	2	4	4	10	14,894
Major	1	0	0	1	7,000
Marshall	38	2	13	53	189,738
Mayes	0	0	1	1	439
Murray	0	0	1	1	2,257
Muskogee	33	0	17	50	94,725
Noble	70	2	59	131	405,230
Nowata	23	1	11	35	41,520
Okfuskee	75	8	45	128	371,070
Oklahoma	49	0	15	64	398,470
Okmulgee	246	21	193	460	788,429



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PRODUCTION PROVED FOR LONGER LIFE

Single or multiple . . . regular or heavy duty . . . standard or extended pitch . . . steel, stainless steel or bronze and precision matched sprockets for each. Atlas makes them all to stand up and last longer on any type of drive.

The Atlas exclusive heat treating process for hardening bushings and pins assures built-in stamina and super-life to every length of chain. Heat treating results in a tough outer surface bound to a core of steel which assures greater strength and wear resistance.

Each link plate and roller is made of wear-resistant, heat treated alloy steel with precision-uniformity scientifically achieved with the most modern electronically controlled furnaces.

Whatever your requirements in roller chain, look to Atlas for longer life and better service. Atlas Engineers are ready to supply you with the exact type of chain for the drive that will provide greater efficiency . . . improved economy . . . and less maintenance. For the full story on how Atlas can cut your costs on every drive write to Atlas Chain and Manufacturing Company, West Pittston, Penna.

ATLAS ROLLER CHAIN and SPROCKETS

Drilling by Counties

	Oil	Gas	Dry	Total	Footage
Osage	785	2	258	1,045	2,417,478
Ottawa	0	0	4	4	2,147
Pawnee	123	3	72	198	509,693
Payne	126	6	48	180	623,562
Pittsburg	0	1	0	1	2,210
Pontotoc	146	21	56	233	380,729
Pottawatomie	75	0	39	114	429,913
Rogers	24	0	39	63	57,759
Seminole	180	7	90	277	793,688
Stephens	245	16	96	357	1,272,022
Texas	12	40	16	68	300,401
Tillman	16	0	13	29	132,374
Tulsa	45	1	38	84	116,572
Wagoner	42	4	57	103	106,665
Washington	38	6	16	54	69,988
Washita	9	0	1	10	66,915
Woods	7	0	0	7	43,357
Total	*4,977	328	†2,274	7,579	24,016,678

*Incl 77 dist. †Incl 333 service wells.

MISSISSIPPI
Wildcat Completions by Counties

	Oil	Gas	Dry	Total	Footage
Adams	3	0	23	26	171,887
Bolivar	0	0	1	1	5,150
Calhoun	0	0	1	1	9,771
Claiborne	0	0	1	1	6,020
Clarke	0	0	2	2	9,957
Covington	0	0	1	1	9,003
Forrest	0	0	3	3	28,050
Franklin	1	0	10	11	74,853
George	0	0	4	4	38,936
Greene	0	0	2	2	20,317
Hancock	0	0	3	3	25,637
Hinds	1	0	6	7	71,587
Itawamba	0	0	5	5	6,287
Jackson	0	0	1	1	8,810
Jasper	0	0	2	2	11,015
Jefferson	5	0	31	36	224,655
Jones	1	0	6	7	64,809
Lamar	0	0	2	2	18,221
Lincoln	0	0	1	1	11,016
Madison	0	0	4	4	31,831
Marion	0	0	1	1	9,691
Marshall	0	0	1	1	4,003
Monroe	0	0	3	3	12,223
Pearl River	1	0	0	1	9,849
Pontotoc	0	0	2	2	13,154
Prentiss	0	0	1	1	2,486
Rankin	0	0	1	1	11,029
Scott	0	0	1	1	6,625
Sharkey	0	0	1	1	5,420
Simpson	0	0	1	1	13,334
Stone	0	0	2	2	17,702
Sunflower	0	0	1	1	5,689
Tallahatchie	0	0	1	1	3,505
Tippah	0	0	1	1	2,340
Tishomingo	0	0	1	1	1,785
Union	0	0	1	1	2,500
Wayne	0	0	13	13	77,787
Warren	0	0	1	1	5,762
Wilkinson	2	0	23	25	197,573
Yazoo	0	0	3	3	23,326
Total	14	0	168	182	1,274,204

MISSISSIPPI
Development Completions by Counties

	Oil	Gas	Dry	Total	Footage
Adams	30	0	36	66	417,805
Amite	0	0	1	1	11,919
Forrest	14	0	4	18	137,836
Franklin	3	0	9	12	82,884
Hinds	10	0	4	14	147,790
Jasper	41	0	5	46	414,245
Jefferson	10	0	13	23	130,688
Jefferson Davis	1	0	0	1	18,250
Jones	17	0	2	19	194,697
Madison	3	0	2	5	32,523
Monroe	0	1	0	1	3,600
Pearl River	2	0	0	2	18,571
Perry	0	0	1	1	13,772
Smith	12	0	0	12	146,709
Wayne	2	0	8	10	52,324
Wilkinson	9	0	13	22	163,845
Yazoo	12	0	1	13	75,343
Total	*166	1	99	266	2,064,801

*Incl. 18 cond. wells.

ALABAMA
Wildcat Completions by Counties

	Oil	Gas	Dry	Total	Footage
Baldwin	0	0	3	3	20,043
Blount	0	0	1	1	1,500
Choctaw	0	0	4	4	19,950
Clarke	0	0	4	4	20,360
Escambia	0	0	6	6	33,978
Fayette	0	0	3	3	6,316
Franklin	0	0	4	4	7,023
Geneva	0	0	2	2	8,201
Madison	0	0	1	1	1,156
Marion	0	0	1	1	2,262
Mobile	1	0	4	5	43,574
Sumpter	0	0	1	1	4,590
Washington	0	0	1	1	6,856
Wilcox	0	0	4	4	10,010
Total	1	0	39	40	195,819

ALABAMA
Development Completions by Counties

	Oil	Gas	Dry	Total	Footage
Choctaw*	0	0	0	0	506
Fayette	0	0	1	1	3,653
Total	0	0	1	1	4,159

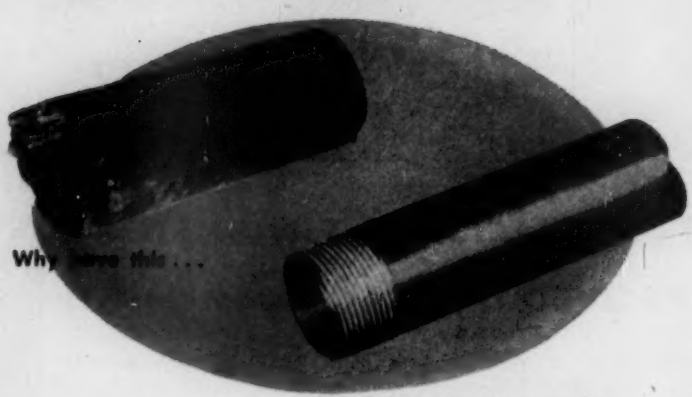
*D.D.

FLORIDA
Wildcat Completions by Counties

	Oil	Gas	Dry	Total	Footage
Alachva	0	0	1	1	3,524
Bay	0	0	1	1	4,525
Calhoun	0	0	1	1	4,515
Collier	0	0	1	1	11,937
Hendry	0	0	1	1	11,595
Highlands	0	0	1	1	12,630
Holmes	0	0	5	5	20,079
Jackson	0	0	3	3	11,025
Manatee	0	0	1	1	11,226
Monroe	0	0	1	1	12,630
Okaloosa	0	0	1	1	6,245
Okeechobee	0	0	1	1	10,838
Orange	0	0	1	1	6,589
Palm Beach	0	0	1	1	11,030
Pinellas	0	0	1	1	1,827
Santa Rosa	0	0	5	5	33,323
Walton	0	0	2	2	9,810
Washington	0	0	1	1	4,170
Total	0	0	29	29	187,518

TK-2 PLASTIC LININGS

Dependable protection against corrosion and paraffin deposits...



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FLORIDA

Development Completions by Counties

	Oil	Gas	Dry	Total	Footage
Dade	0	0	1	1	11,625
Total	0	0	1	1	11,625

GEORGIA

Wildcat Completions by Counties

	Oil	Gas	Dry	Total	Footage
Coffee	0	0	1	1	4,130
Sumpter	0	0	1	1	5,121
Total	0	0	2	2	9,251

WESTERN KENTUCKY

Wildcat Completions by Counties

	Oil	Gas	Dry	Total	Footage
Bell	0	0	1	1	5,697
Breckenridge	1	0	3	4	2,152
Butler	1	0	6	7	7,883
Caldwell	0	0	5	5	6,120
Christian	19	4	113	136	115,929
Crittenden	0	0	1	1	1,228
Daviess	4	0	18	22	38,070
Grayson	0	0	2	2	3,670
Hancock	1	0	7	8	11,931
Hart	1	0	2	3	2,859
Henderson	9	0	21	30	72,286
Hopkins	0	0	13	13	27,602
Logan	0	0	6	6	6,146
Mayes	0	0	1	1	970
McLean	5	0	9	14	29,949
Muhlenberg	10	1	54	65	85,086
Ohio	0	0	4	4	3,744
Todd	1	0	42	43	43,143
Union	0	0	7	7	21,874
Warren	0	0	2	2	2,680
Webster	0	0	2	2	5,392
Total	52	5	319	376	494,411

WESTERN KENTUCKY

Development Completions by Counties

	Oil	Gas	Dry	Total	Footage
Breckenridge	1	0	2	3	1,165
Butler	0	0	5	5	5,419
Caldwell	0	0	1	1	1,671
Christian	237	11	67	315	228,253
Daviess	76	0	83	159	195,391
Hancock	7	0	12	19	10,659
Hart	2	0	1	3	2,852
Henderson	59	0	67	126	287,332
Hopkins	0	0	2	2	2,565
Logan	0	0	1	1	739
McLean	57	0	39	96	168,755
Muhlenberg	79	3	59	141	167,328
Ohio	2	0	12	14	13,491
Todd	8	1	10	19	17,420
Union	34	0	30	64	151,314
Warren	1	0	0	1	1,072
Webster	19	0	23	42	81,512
Total	*582	15	414	1,011	1,316,928

*Incl. 2 service wells.

EASTERN KENTUCKY

Total Completions by Counties

	Oil	Gas	Dry	Total	Footage
Bell	0	2	3	5	19,453
Breathitt	2	1	4	7	14,422
Clay	0	2	3	5	13,471
Elliott	0	0	2	2	1,822
Floyd	0	13	2	15	38,907
Johnson	9	0	1	10	10,342
Knott	0	16	1	17	48,609
Laurel	0	1	0	1	3,559
Lawrence	3	0	0	3	2,640
Leslie	0	5	5	10	29,074
Letcher	0	4	1	5	18,409
Magoffin	4	9	5	18	29,100
Martin	2	3	4	9	18,318
Perry	0	6	2	8	21,982
Pike	0	80	9	89	289,778
Powell	1	0	0	1	838
Total	21	142	42	205	560,724

ILLINOIS

Wildcat Completions by Counties

	Oil	Gas	Dry	Total	Footage
Adams	0	1	1	2	1,331
Bond	3	0	31	34	41,986
Cass	0	0	1	1	393
Champaign	0	0	1	1	1,808
Christian	5	0	23	28	54,179
Clark	1	0	4	5	6,998
Clay	2	0	18	20	60,716
Clinton	1	0	33	34	61,641
Coles	3	0	5	8	12,384
Crawford	1	0	11	12	24,584
Cumberland	0	0	6	6	9,701
Douglas	1	0	5	6	6,686
Edgar	0	1	11	12	9,755
Edwards	4	0	6	10	33,565
Effingham	1	0	11	12	29,758
Fayette	0	0	6	6	13,930
Franklin	1	0	7	8	24,337
Fulton	0	0	1	1	765
Gallatin	7	0	12	19	52,203
Greene	0	0	1	1	1,232
Hamilton	2	0	11	13	43,845
Hancock	0	0	2	2	1,503
Hardin	0	0	1	1	1,501
Iroquois	0	0	2	2	1,901
Jackson	0	0	5	5	9,482
Jasper	1	0	13	14	43,196
Jefferson	1	0	14	15	37,543
Jersey	0	0	4	4	3,259
Johnson	0	0	2	2	4,470
Kankankee	0	0	3	3	3,416
Lawrence	1	0	9	10	19,862
Logan	0	0	1	1	1,391

Drilling by Counties

	Oil	Gas	Dry	Total	Footage
McDonough	0	0	6	6	4,373
Macon	0	0	12	12	26,622
Macoupin	1	0	15	16	25,768
Madison	2	0	12	14	9,996
Marion	5	0	20	25	69,958
Mercer	0	0	2	2	2,619
Montgomery	0	0	12	12	17,275
Morgan	0	0	4	4	2,705
Moultrie	1	0	4	5	14,150
Perry	0	0	12	12	21,515
Platt	0	0	1	1	2,420
Pike	0	3	5	8	4,847
Pope	0	0	1	1	800
Randolph	1	0	6	7	11,857
Richland	1	0	4	5	15,790
Saline	19	1	49	69	197,970
Sangamon	2	0	33	35	60,640
Schuyler	0	0	3	3	2,623
Shelby	0	0	3	3	5,411

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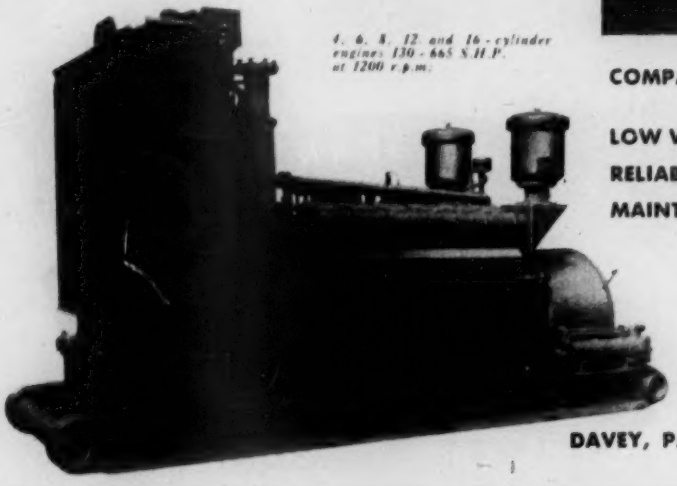

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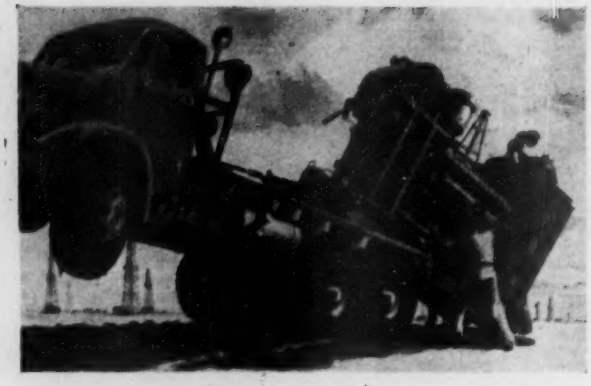

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THE OIL AND GAS JOURNAL

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Drilling by Counties

	Oil	Gas	Dry	Total	Footage
St. Clair	1	0	15	16	23,195
Vermillion	0	0	1	1	1,539
Wabash	0	0	2	2	7,933
Washington	2	0	30	32	62,856
Wayne	2	0	13	15	49,393
White	2	0	15	17	55,821
Williamson	0	0	14	14	37,641
Total	74	6	555	635	1,354,932

ILLINOIS

Development Completions by Counties

	Oil	Gas	Dry	Total	Footage
Bond	85	0	39	124	173,476
Christian	40	0	20	60	128,587
Clark	27	0	28	55	47,613
Clay	112	0	67	179	512,392
Clinton	31	3	28	62	114,742
Coles	19	4	14	37	69,633
Crawford	129	0	86	215	300,762
Cumberland	0	0	3	3	4,363
Douglas	0	0	4	4	4,141
Edgar	3	0	10	13	8,950
Edwards	37	0	34	71	223,302
Effingham	23	0	25	48	124,944
Fayette	4	0	8	12	20,801
Franklin	27	0	18	45	138,037
Gallatin	118	0	69	187	507,998
Hamilton	103	0	68	171	561,958
Hancock	0	0	1	1	465
Jackson	0	0	2	2	2,794
Jasper	111	0	35	146	399,789
Jefferson	43	0	28	71	171,642
Lawrence	173	0	74	247	395,853
Livingston	0	0	1	1	385
Macon	1	0	4	5	10,798
Macoupin	0	0	7	7	8,036
Madison	3	0	19	22	13,878
Marion	51	0	21	72	179,085
Monroe	0	0	2	2	3,303
Montgomery	0	0	3	3	1,863
Morgan	0	1	2	3	963
Moultrie	3	0	2	5	12,185
McDonough	2	0	3	5	2,540
Perry	0	0	2	2	2,472
Pike	0	2	0	2	1,244
Randolph	3	0	1	4	9,045
Richland	89	0	38	127	378,267
Saline	177	0	101	278	735,252
Sangamon	5	0	12	17	30,052
Wabash	74	0	66	140	321,116
Washington	60	0	33	93	144,364
Wayne	175	0	76	251	813,272
White	298	0	158	456	1,368,299
Total	2,026	10	*1,221	3,257	7,947,641

*Incl. 3 service wells.

INDIANA

Wildcat Completions by Counties

	Oil	Gas	Dry	Total	Footage
Blackford	0	0	1	1	1,026
Boone	0	0	3	3	1,516
Clark	0	0	2	2	3,297
Clay	0	0	2	2	3,352
Crawford	0	0	6	6	4,166
Daviess	2	0	20	22	22,741
DeKalb	0	0	1	1	570
Delaware	0	0	1	1	1,300
DuBois	2	0	15	17	20,817
Elkhart	0	0	1	1	771
Gibson	0	0	22	22	45,226
Greene	0	0	7	7	5,810
Hancock	0	0	1	1	1,047
Henry	0	0	2	2	2,669
Jackson	0	0	1	1	505
Jay	0	0	1	1	1,035
Knox	0	0	5	5	7,757
Kascuisko	0	0	1	1	1,641
LaGrange	0	0	1	1	2,487
LaPorte	0	0	12	12	5,856
Lawrence	0	0	1	1	1,703
Marion	0	0	1	1	1,138
Martin	0	0	3	3	4,585
Miami	0	0	3	3	3,276
Montgomery	0	0	1	1	849
Noble	0	0	1	1	426
Orange	0	0	2	2	3,495
Perry	0	0	8	8	6,667
Pike	1	0	13	14	20,625
Posey	3	0	22	25	62,349
Randolph	0	0	3	3	3,652
Shelby	0	0	1	1	1,010
Spencer	2	0	17	19	21,034
Steuben	0	0	1	1	2,584
Sullivan	1	0	17	18	26,871
Vanderburgh	0	0	6	6	14,379
Vermillion	0	0	3	3	5,241
Vigo	0	0	32	32	46,660
Warrick	0	0	7	7	10,378
Washington	0	0	2	2	1,527
Wells	0	0	1	1	1,406
Total	11	0	250	261	373,424

INDIANA

Development Completions by Counties

	Oil	Gas	Dry	Total	Footage
Adams	1	0	0	1	1,033
Allen	1	0	0	1	1,429
Clark	0	0	1	1	1,601
Clay	1	0	1	2	3,084
Daviess	14	0	18	32	29,044
Decatur	0	8	0	8	7,193
Delaware	1	0	2	3	3,770
DuBois	9	0	12	21	18,867
Gibson	38	0	36	74	143,344
Harrison	0	0	3	3	822
Henry	0	0	1	1	1,309
Huntington	0	0	1	1	1,100
Jay	0	3	2	5	5,630
Jennings	0	0	1	1	1,434
Knox	9	0	8	17	25,211
Miami	4	0	1	5	3,973
Perry	0	0	6	6	2,613
Pike	19	1	19	39	54,873
Posey	79	1	52	132	309,749
Randolph	1	0	2	3	3,919
Rush	0	2	0	2	1,736
Shelby	0	3	0	3	2,617
Spencer	8	0	31	39	39,631
Sullivan	2	4	15	21	23,933
Vanderburgh	2	0	10	12	22,667
Vigo	4	0	5	9	15,836

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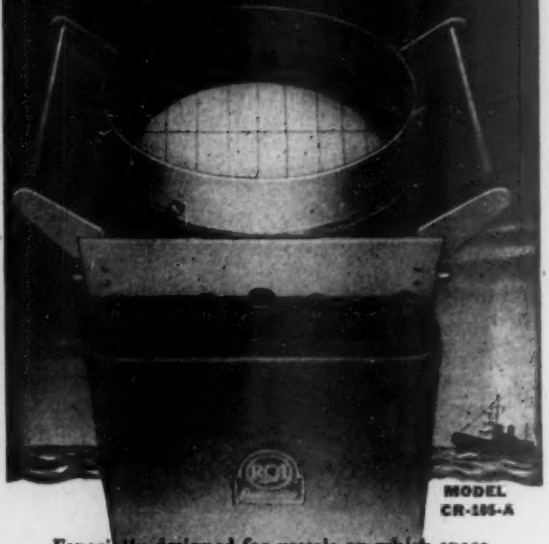

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Drilling by Counties

	Oil	Gas	Dry	Total	Footage
Wabash	1	0	1	2	1,731
Warrick	0	0	1	1	1,802
Total	194	22	*229	445	729,958

*Incl. 2 service wells.

MICHIGAN
Wildcat Completions by Counties

	Oil	Gas	Dry	Total	Footage
Allegan	2	0	14	16	24,270
Arenac	1	0	3	4	13,465
Barry	0	0	1	1	5,094
Berrien	0	0	2	2	2,698
Branch	0	0	1	1	2,653
Calhoun	0	0	4	4	9,136
Cheboygan	0	0	1	1	3,588
Clare	1	0	5	6	24,148
Clinton	0	0	3	3	12,776
Gladwin	0	0	1	1	1,380
Gratiot	0	0	4	4	13,033
Hillsdale	0	0	3	3	8,897
Huron	0	0	1	1	3,873
Ionia	0	0	1	1	2,994
Isabella	1	0	7	8	29,653
Jackson	0	0	6	6	22,704
Kalamazoo	0	0	1	1	1,391
Kent	0	0	2	2	7,346
Lake	0	0	2	2	8,122
Lapeer	0	0	1	1	2,528
Lenawee	0	0	2	2	5,175
Livingston	0	0	3	3	15,025
Macomb	0	0	1	1	5,001
Mason	0	0	5	5	10,457
Mecosta	0	0	6	6	21,567
Midland	0	0	2	2	8,606
Missaukee	0	0	2	2	10,526
Monroe	0	0	8	8	18,517
Montcalm	0	0	13	13	43,031
Montmorency	0	0	1	1	2,798
Muskegon	0	0	2	2	3,818
Newaygo	1	0	8	9	22,529
Oakland	1	0	8	9	35,832
Oceana	1	0	14	15	32,644
Osceola	1	0	9	10	38,931
Oscoda	0	0	1	1	4,358
Ottawa	1	0	14	15	27,038
Roscommon	0	0	2	2	10,205
St. Clair	1	1	3	5	13,818
St. Joseph	0	0	1	1	3,099
Saginaw	1	0	6	7	23,003
Tuscola	0	0	3	3	7,303
Van Buren	0	0	7	7	8,280
Washtenaw	0	0	8	8	33,542
Wayne	0	1	6	7	23,699
Total	12	2	198	212	628,557

MICHIGAN
Development Completions by Counties

	Oil	Gas	Dry	Total	Footage
Allegan	28	0	6	34	48,838
Arenac	17	0	2	19	70,901
Barry	2	0	1	3	5,646
Bay	1	0	2	3	8,493
Clare	25	0	7	32	148,217
Genesee	0	0	1	1	1,530
Gladwin	3	0	1	4	18,128
Gratiot	3	0	1	4	11,427
Huron	0	0	1	1	3,381
Ionia	0	0	1	1	2,962
Isabella	5	0	5	10	39,111
Jackson	2	0	0	2	3,242
Kalamazoo	1	0	0	1	1,333
Kent	2	0	0	2	3,757
Mason	4	0	0	4	9,136
Mecosta	0	0	4	4	9,964
Midland	1	0	2	3	12,458
Montcalm	9	1	7	17	53,603
Muskegon	5	0	10	15	28,294
Newaygo	8	0	11	19	43,582
Oakland	0	0	8	8	10,100
Oceana	3	0	2	5	8,732
Ogemaw	25	2	5	32	129,951
Osceola	1	0	0	1	4,643
Oscoda	0	0	1	1	4,325
Ottawa	9	0	7	16	28,747
Roscommon	5	0	0	5	26,237
St. Clair	0	0	1	1	2,500
Saginaw	2	0	0	2	5,220
Tuscola	6	0	1	7	21,789
Van Buren	11	0	6	17	19,772
Washtenaw	2	6	5	13	55,074
Wayne	2	8	3	13	52,639
Total	183	17	101	300	893,822

OHIO
Wildcat Completions by Counties

	Oil	Gas	Dry	Total	Footage
Coshocton	2	1	1	4	13,753
Cuyahoga	1	0	1	2	6,809
Gallia	0	0	1	1	2,078
Guernsey	0	0	1	1	3,419
Holmes	0	1	1	2	6,288
Knox	0	1	1	2	5,686
Morgan	0	0	1	1	2,355
Morrow	0	0	1	1	3,775
Muskingum	1	0	0	1	3,212
Noble	0	1	1	2	12,427
Perry	0	1	0	1	802
Portage	0	0	1	1	3,811
Stark	0	0	1	1	5,383
Tuscarawas	0	0	2	2	1,957
Washington	0	1	1	2	11,783
Wayne	1	1	1	3	10,786
Total	5	7	15	27	94,324

OHIO
Development Completions by Counties

	Oil	Gas	Dry	Total	Footage
Ashland	67	2	47	116	106,661
Ashtabula	0	2	0	2	6,235
Athens	10	33	12	55	62,345
Belmont	0	0	1	1	1,269
Coshocton	81	7	21	109	346,442
Cuyahoga	6	4	1	11	33,418
Fairfield	1	1	5	7	14,153
Gallia	0	2	4	6	10,175
Guernsey	9	5	24	38	36,004
Hocking	32	4	21	57	151,203
Holmes	44	7	20	71	205,677
Jefferson	0	0	2	2	1,908
Knox	56	7	6	69	193,123
Licking	97	10	23	130	327,770
Lorain	4	1	7	12	24,648
Medina	3	3	11	17	38,543
Meigs	7	57	7	71	99,109
Monroe	12	18	30	60	97,340
Morgan	0	5	2	7	7,477
Muskingum	43	3	5	51	158,396
Noble	9	10	13	32	40,659
Perry	19	6	12	37	95,200
Pike	0	3	2	5	4,595
Scioto	0	7	1	8	2,779
Stark	4	1	0	5	23,391
Summit	18	8	8	34	81,286
Tuscarawas	45	13	23	81	159,398
Vinton	1	1	1	3	6,237
Washington	33	16	35	84	66,815

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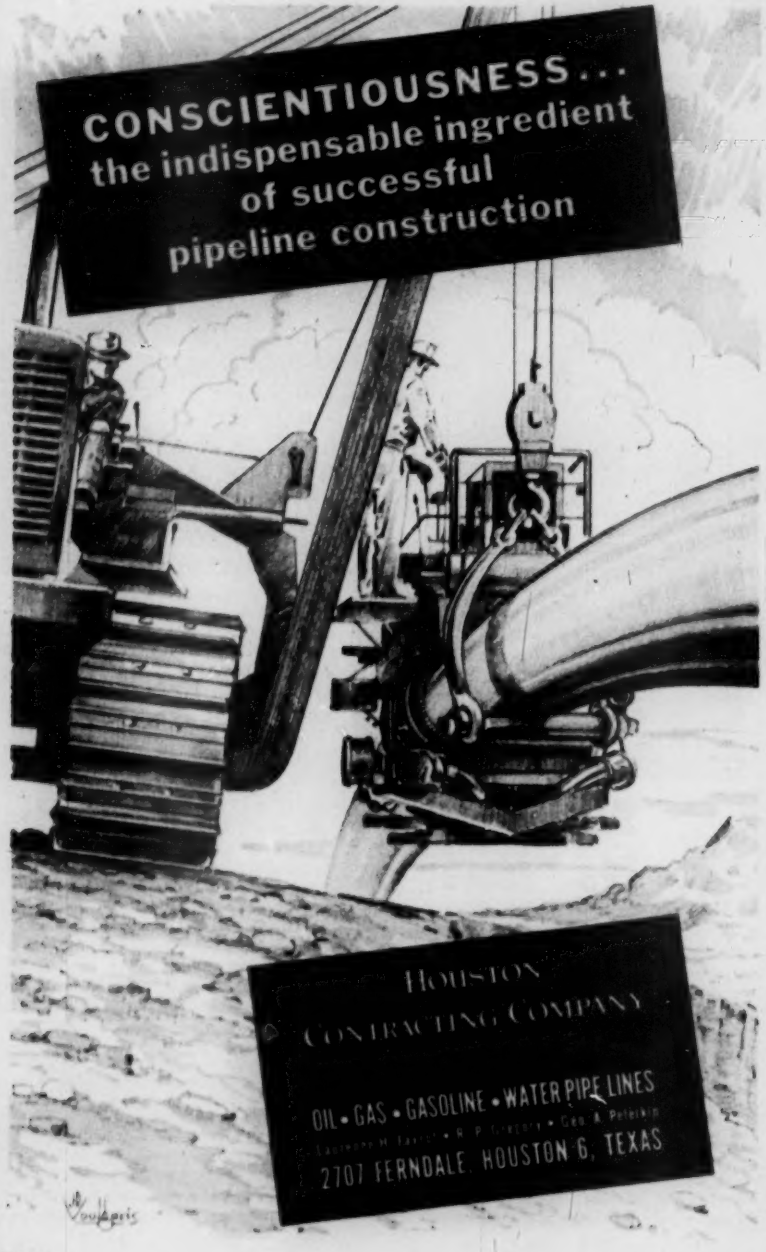
Drilling by Counties

	Oil	Gas	Dry	Total	Footage
Wayne	19	5	10	34	95,637
Wyandot	2	0	6	8	11,374
Total	636	243	*333	1,232	2,547,400

*Incl. 28 service wells.

CALIFORNIA
Wildcat Completions by Counties

	Oil	Gas	Dry	Total	Footage
Alameda	0	0	1	1	2,500
Butte	0	1	1	2	5,320
Colusa	0	2	7	9	32,062
Contra Costa	0	0	1	1	9,278
Fresno	4	0	41	45	373,302
Glenn	0	2	6	8	64,172
Humbolt	0	0	1	1	5,591
Kern	29	3	138	161	864,594
Kings	1	0	9	10	40,145
Los Angeles	4	1	37	42	298,862
Madera	0	0	2	2	7,867
Merced	0	0	1	1	6,000
Monterey	0	0	9	9	32,187
Orange	4	0	40	44	293,418
Riverside	0	0	1	1	1,479
Sacramento	0	2	2	4	19,345
San Benito	2	1	7	10	41,687
San Bernardino	0	0	14	14	31,965
San Joaquin	0	0	8	8	38,393
San Luis Obispo	1	0	27	28	120,850
San Mateo	1	0	1	2	6,441
Santa Barbara	1	0	14	15	71,063
Solano	0	0	10	10	56,824
Sonoma	0	0	1	1	2,008
Stanislaus	0	0	2	2	9,057
Sutter	0	0	5	5	21,835
Tehama	0	0	1	1	8,017
Tulare	0	0	20	20	39,776
Ventura	7	0	52	59	457,139
Yolo	0	2	12	14	72,332
Totals	45	14	471	530	3,033,542



CALIFORNIA
Development Completions by Counties

	Oil	Gas	Dry	Total	Footage
Butte	0	5	1	6	22,170
Colusa	0	1	1	2	5,674
Contra Costa	0	2	1	3	13,560
Fresno	86	0	8	94	550,094
Glenn	0	16	10	26	149,162
Kern	535	8	65	608	2,196,295
Kings	22	0	5	27	61,092
Los Angeles	416	0	26	442	2,430,960
Madera	0	4	2	6	18,701
Monterey	50	0	0	50	104,456
Orange	412	0	31	443	2,219,601
Sacramento	0	5	5	10	43,194
San Benito	1	1	2	4	17,212
San Bernardino	4	0	0	4	11,374
San Luis Obisjo	21	0	5	26	77,829
San Mateo	1	0	0	1	2,627
Santa Barbara	17	0	2	19	92,633
Santa Clara	2	0	0	2	1,999
Solano	0	3	1	4	23,674
Sonoma	0	1	0	1	1,466
Sutter	0	1	0	1	2,128
Tehama	0	1	1	2	6,464
Tulare	5	0	6	11	9,769
Ventura	130	0	9	139	1,610,276
Yolo	0	2	2	4	18,449
Totals	1,702	50	183	1,935	9,690,869

SOUTHEAST NEW MEXICO
Wildcat Completions by Counties

	Oil	Gas	Dry	Total	Footage
Chaves	6	0	15	21	94,758
Eddy	5	0	20	25	91,845
Lea	22	0	39	61	477,443
Lincoln	0	0	1	1	3,562
Roosevelt	0	0	2	2	15,158
Total	33	0	77	110	682,766

SOUTHEAST NEW MEXICO
Development Completions by Counties

Chaves	263	4	17	284	882,374
Eddy	97	1	24	122	364,474
Lea	456	36	68	560	3,008,583
Total	816	41	109	966	4,235,431

NORTHWEST NEW MEXICO
Wildcat Completions by Counties

Colfax	0	0	4	4	15,538
McKinley	0	0	4	4	10,130
Rio Arriba	0	10	4	14	58,630
Sandoval	4	0	8	12	44,603
San Juan	4	1	9	14	74,870
Total	8	11	29	48	193,771

NORTHWEST NEW MEXICO
Development Completions by Counties

Rio Arriba	2	240	13	255	1,053,847
Sandoval	0	1	1	2	10,737
San Juan	0	271	11	282	869,920
Total	2	512	25	539	1,934,504

COLORADO
Wildcat Completions by Counties

	Oil	Gas	Dry	Total	Footage
Adams	5	0	54	59	355,786
Arapahoe	0	0	21	21	122,119
Baca	0	1	4	5	25,340
Bent	1	0	3	4	22,024
Boulder	0	0	1	1	4,920
Cheyenne	0	0	1	1	5,674
Crowley	0	0	1	1	7,361
Delta	0	0	1	1	6,658
Dolores	0	0	1	1	9,950
Douglas	0	0	1	1	9,847
Eagle	0	0	1	1	6,557
Elbert	1	0	7	8	52,670
El Paso	0	0	12	12	83,314
Garfield	0	0	3	3	21,227
Grand	0	0	2	2	4,844
Huerfano	0	0	1	1	550
Jackson	0	0	4	4	12,662
Jefferson	1	0	2	3	20,216
Kiowa	0	0	2	2	9,755
Kit Carson	0	0	6	6	21,845
La Plata	0	0	1	1	8,217
Larimer	2	0	2	4	14,383
Las Animas	0	0	9	9	20,904
Linoan	0	0	14	14	64,356
Logan	7	5	127	139	704,175
Mesa	2	1	8	11	56,728
Moffat	1	2	4	7	42,888
Montezuma	1	0	3	4	16,401
Montrose	0	0	3	3	4,587

	Oil	Gas	Dry	Total	Footage
Morgan	12	2	136	150	875,115
Phillips	0	1	5	6	21,435
Prowers	0	0	2	2	10,723
Pueblo	0	0	1	1	4,258
Rio Blanco	0	1	11	12	52,251
Saguache	0	0	1	1	630
San Miguel	0	0	1	1	10,290
Sedgwick	0	0	5	5	15,883
Washington	16	7	164	187	881,964
Weld	5	3	79	87	612,104
Yuma	0	0	30	30	106,204
Total	54	23	734	811	4,333,015

COLORADO

Development Completions by Counties

Adams	19	1	23	43	259,647
Archuleta	0	0	2	2	1,858
Baca	0	2	0	2	6,668
Bent	0	0	1	1	5,401
Elbert	0	0	1	1	7,146
Garfield	0	0	1	1	3,578
Jackson	3	0	1	4	20,538
Jefferson	0	0	1	1	9,587
La Plata	0	25	7	32	172,963
Larimer	1	0	0	1	5,784
Logan	112	9	71	192	1,001,536
Mesa	0	1	0	1	1,203
Moffat	2	6	8	16	99,558
Montezuma	0	1	0	1	7,500
Morgan	42	5	56	103	598,104
Rio Blanco	2	5	8	15	48,333
Sedgwick	0	0	2	2	6,864
Washington	138	5	79	222	1,114,443
Weld	29	1	28	58	399,742
Total	348	61	289	698	3,770,353

WESTERN NEBRASKA

Wildcat Completions by Counties

Banner	4	0	62	66	399,381
Box Butte	0	0	15	15	53,387
Buffalo	0	0	1	1	3,767
Chase	0	0	3	3	10,499
Cherry	0	0	3	3	13,494
Cheyenne	9	1	91	101	511,541
Dawes	0	0	8	8	28,783
Deuel	0	0	5	5	19,282
Frontier	0	0	2	2	7,165
Furnas	0	0	1	1	3,512
Garden	0	0	7	7	28,331
Grant	0	0	1	1	4,000
Hays	0	0	1	1	4,241
Kimball	28	0	101	129	815,658
Logan	0	0	1	1	3,866
Morrill	1	0	20	21	94,209
Perkins	0	0	3	3	10,565
Phelps	0	0	1	1	4,056
Red Willow	0	0	1	1	3,990
Scotts Bluff	0	0	10	10	52,226
Sheridan	0	0	3	3	11,181
Sioux	0	0	5	5	28,523
Total	42	1	345	388	2,111,957

WESTERN NEBRASKA

Development Completions by Counties

Banner	65	0	49	114	583,304
Cheyenne	47	1	56	104	529,186
Deuel	0	2	2	4	13,687
Kimball	138	0	94	232	1,474,785
Morrill	13	0	0	13	69,797
Total	263	3	201	467	2,770,760

WYOMING

Wildcat Completions by Counties

Albany	1	0	10	11	40,388
Big Horn	3	0	18	21	90,911
Campbell	0	0	6	6	42,778
Carbon	1	0	12	13	82,501
Converse	1	0	2	3	20,391
Crook	1	0	5	6	27,054
Fremont	2	1	15	18	91,225
Goshen	1	0	18	19	39,927
Hot Springs	0	0	10	10	48,692
Johnson	1	0	11	12	23,103
Laramie	1	0	11	12	84,442
Lincoln	0	0	2	2	10,014
Natrona	8	2	39	49	253,548
Niobrara	1	0	10	11	43,801
Park	2	0	5	7	42,286
Sheridan	0	0	18	18	116,393
Sublette	0	5	7	12	83,702
Sweetwater	0	1	10	11	81,964
Teton	0	0	2	2	11,142
Uinta	0	0	2	2	10,062
Washakie	2	0	4	6	39,046
Weston	1	0	10	11	67,805
Total	28	9	227	262	1,351,169

WYOMING

Development Completions by Counties

Albany	1	0	3	4	11,351
Big Horn	29	5	9	43	193,202
Carbon	1	1	5	7	36,279
Converse	28	0	6	34	195,036
Crook	5	0	11	16	17,091
Fremont	34	1	10	45	217,920
Goshen	6	0	5	11	77,047
Hot Springs	36	0	5	41	165,449
Johnson	39	0	12	51	286,990
Laramie	6	0	2	8	59,433
Lincoln	0	0	1	1	3,285
Natrona	39	1	16	56	225,336
Niobrara	6	0	8	14	71,275
Park	27	0	8	35	165,821
Sheridan	17	0	7	24	119,538
Sublette	2	21	13	36	109,545
Sweetwater	0	6	1	7	42,481
Uinta	0	0	1	1	752
Washakie	10	1	5	16	92,906
Weston	127	1	75	203	1,042,359
Total	413	37	203	653	3,133,096

SOUTH DAKOTA

Wildcat Completions by Counties

Custer	1	0	3	4	9,767
Fall River	0	0	3	3	7,780
Haakon	0	0	1	1	5,555
Harding	0	0	4	4	28,827
Pennington	0	0	2	2	5,803
Stanley	0	0	2	2	6,752
Total	1	0	15	16	64,484

NORTH DAKOTA

Development Completions by Counties

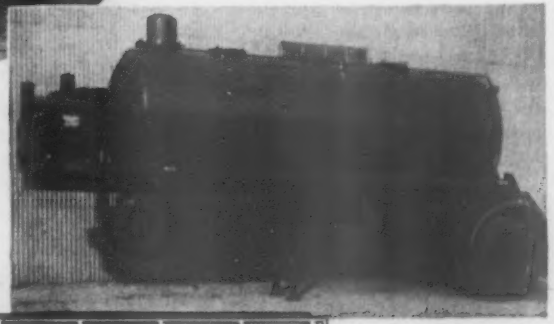
Billings	3	0	0	3	28,172
Bottineau	21	0	8	29	93,536
Burke	3	0	3	6	48,892
McKenzie	33	0	4	37	330,336

MOVING DRILLING MUD *FAST!*

Just for the record, this moving job during a changeover was timed, and here are the results: Exactly 8 minutes, 33 seconds after the driver yanked up on the emergency brake, 45 bbls. of 12 lb. mud was snugly inside the Thompson Unitized Vacuum Tank!

TO THE NEXT HOLE

From there to the next hole was discounted as driving time. Starting the stop watch again when the driver had backed up to the shaker pit, the one man laid hose, opened the valve and had the tank empty in 4 minutes 10 seconds.



This new Vacuum Tank Trailer, complete with engine and pump, is now available. Write for specifications and price!

GET ALL THE FACTS

There's a Thompson Unitized Vacuum Tank built to do your jobs fast, too! Cleaning tanks, draining sumps, pumping out cellars, agitating mud, spraying roads, weeds, etc., are everyday chores for this workhorse. Check UVTs: 20-100 bbls. capacity; truck, trailer, semi-trailer or skid mounted.

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TANK and MANUFACTURING CO. Inc.
2019 EAST WARDLOW RD. LONG BEACH 7, CALIFORNIA

SOLE LICENSEE TO MANUFACTURE VACUUM TANKS UNDER U.S. PATENT NO. 2522077

A PUMP PACKING THAT'S EXPENSIVE, BUT CHEAP!

Heavy Teflon† impregnation throughout
Choice of Canadian white asbestos or blue African asbestos
Unique LATTICE BRAID* construction plus Teflon core

Lasts at least 3 times longer than ordinary pump packings

Frankly, the service reports on LATTICE BRAID asbestos packing with Teflon surprised us! Originally designed and test-proven for use against severe acids, caustics, and other chemicals, this particular packing has out-performed other packings (*even our own*) on more common applications against water, steam, solvents, and oils.

And here's why: (1) The LATTICE BRAID construction gives greater strength; (2) The Teflon core and heavy Teflon impregnation resist everything except molten alkali metals and some freons; (3) It does not adhere to the shaft or rod; (4) It runs smoother and freer than packings without Teflon.

Check these typical service reports:

- Against blending waxes and steam (for cleaning), it outlasted another Garlock style 10 to 1
- Against caustic at 325°F., 50 p.s.i., it outlasted competitive packing 38 to 1
- Against cold water, it out-performed other packings 3 to 1

LATTICE BRAID with Teflon is available in either Canadian white asbestos (style 5861) or blue African asbestos (style 5880). Each is furnished in packing sizes 5/16" to 1½" graduated by sixteenths.

Try an order of 10 feet or more today. Chances are you can *reduce* down-time, maintenance and replacement costs to *one-third* of their present amount.

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Sales Offices and Warehouses: Baltimore • Birmingham • Boston • Buffalo Chicago • Cincinnati • Cleveland • Denver • Detroit • Houston Los Angeles • New Orleans • New York City • Palmyra (N.Y.) Philadelphia • Pittsburgh • Portland (Oregon) • Salt Lake City • San Francisco • St. Louis • Seattle • Spokane • Tulsa.
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Dry Moisture Twice As Fast!

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IN YOUR DEHYDRATOR!

- Nearly double dehydrator efficiency.
- Maintain efficiency at temperatures as high as 120°F.
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- Eliminate caking, reduce channeling, dusting and pressure drops.

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Process Products

SOCONY MOBIL OIL COMPANY, INC.

26 Broadway, New York 4, N. Y., and Affiliates: MAGNOLIA PETROLEUM CO., GENERAL PETROLEUM CORP.

	Oil	Gas	Dry	Total	Footage
Mountrail	22	0	3	25	207,924
Renville	0	0	1	1	4,648
Williams	76	0	4	80	676,568
Total	158	0	23	181	1,390,076

NORTH DAKOTA

Wildcat Completions by Counties

Billings	0	0	2	2	21,410
Bottineau	2	0	28	30	111,543
Burke	1	0	5	6	38,653
Burleigh	0	0	1	1	7,230
Dunn	0	0	5	5	51,022
McHenry	0	0	2	2	10,963
McKenzie	1	0	3	4	37,421
Nelson	0	0	1	1	1,700
Pembina	0	0	1	1	1,541
Renville	1	0	4	5	26,258
Richland	0	0	1	1	453
Roulette	0	0	4	4	15,282
Stark	0	0	2	2	21,449
Ward	0	0	2	2	13,178
Williams	2	0	1	3	25,913
Total	7	0	62	69	384,016

MONTANA

Wildcat Completions by Counties

Carter	0	0	3	3	20,696
Cascade	0	0	2	2	5,405
Chouteau	0	0	1	1	3,114
Custer	0	0	17	17	50,288
Daniels	0	0	2	2	17,734
Dawson	1	0	2	3	30,071
Fallon	4	0	2	6	47,051
Fergus	0	0	1	1	817
Garfield	0	0	2	2	15,222
Glacier	2	0	7	9	35,213
Golden Valley	0	0	1	1	8,318
Hill	1	1	7	9	36,186
Judith Basin	0	0	1	1	2,886
Lewis and Clark	0	0	1	1	6,891
McCone	0	0	1	1	9,141
Musselshell	0	0	14	14	55,672
Petroleum	0	0	1	1	1,183
Phillips	0	0	6	6	23,862
Pondera	1	1	11	13	36,746
Powder River	0	1	5	6	20,894
Richland	0	0	1	1	6,993
Roosevelt	1	0	6	7	60,129
Rosebud	3	0	14	17	77,792
Sheridan	0	0	1	1	6,234
Stillwater	0	0	2	2	7,475
Teton	1	0	1	2	7,086
Toole	0	0	6	6	13,401
Treasure	0	0	2	2	12,618
Valley	0	0	7	7	35,587
Wibaux	0	0	1	1	11,424
Yellowstone	1	0	2	3	18,151
Beaverhead	0	0	2	2	5,777
Big Horn	0	0	9	9	29,926
Blaine	0	0	10	10	45,924
Carbon	0	0	3	3	37,099
Total	15	3	154	172	802,896

Development Completions by Counties

Big Horn	5	0	4	9	31,094
Blaine	1	0	0	1	3,408
Carbon	2	0	1	3	17,921
Custer	0	0	2	2	6,409
Dawson	2	0	2	4	36,919
Fallon	18	3	6	27	197,402
Glacier	18	0	10	28	86,143
Liberty	2	0	1	3	7,460
Musselshell	7	0	1	8	23,219
Petroleum	0	0	1	1	1,831
Pondera	2	0	6	8	22,542
Powder River	0	5	3	8	24,918
Prairie	0	0	1	1	9,205
Richland	1	0	0	1	12,683
Roosevelt	22	0	5	27	163,721
Rosebud	12	0	10	22	105,877
Stillwater	1	2	0	3	9,963
Teton	7	0	1	8	17,058
Toole	27	3	16	46	81,736
Wibaux	28	0	1	29	265,708
Total	155	13	71	239	1,125,217

UTAH

Wildcat Completions by Counties

Box Elder	0	0	1	1	1,035
Carbon	1	0	7	8	28,243
Davis	0	0	2	2	5,064
Duchesne	0	1	1	2	21,538
Emery	0	0	4	4	16,824
Grand	2	5	19	26	74,406
Kane	0	0	1	1	9,017
San Juan	1	0	11	12	63,189
San Pete	0	0	1	1	7,767
Tooele	0	0	2	2	9,036
Uintah	1	2	7	10	60,338
Utah	0	0	1	1	4,200
Wayne	0	0	1	1	7,159
Total	5	8	58	71	307,816

UTAH

Development Completions by Counties

Emery	0	1	1	2	13,418
Grand	1	0	8	9	12,675
San Juan	1	0	1	2	11,432
Uintah	7	1	0	8	51,503
Total	9	2	10	21	89,028

ARIZONA

Wildcat Completions by Counties

Apache	0	1	0	1	6,382
Total	0	1	0	1	6,382

IDAHO

Wildcat Completions by Counties

	Oil	Gas	Dry	Total	Footage
Canyon	0	0	2	2	7,086
Gem	0	0	1	1	1,864
Payette	0	1	4	5	7,871
Washington	0	0	1	1	2,338
Total	0	1	8	9	19,159

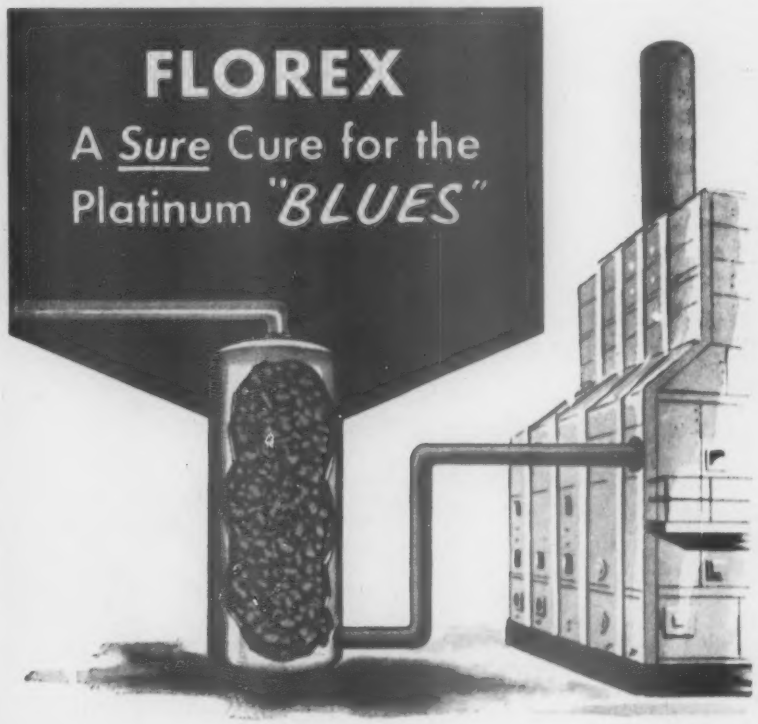
NEVADA

Development Completions by Counties

Nye	2	0	1	3	23,850
Total	2	0	1	3	23,850

Wildcat Completions by Counties

Clark	0	0	2	2	4,571
Elko	0	0	3	3	12,458
Nye	0	0	3	3	19,218
Eureka	0	0	2	2	7,723
Total	0	0	10	10	43,970



The growing use of platinum catalysts in reforming feed stock emphasizes the importance of pre-removing trace metals such as arsenic, lead and sulphur compounds. Platinum catalysts are poisoned by these substances in quantities even as small as ten parts per billion.

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Electric and Radioactivity Logging—1

How the S. P. Curve Originates

by Robert V. West, Jr.

Electrical and radioactivity-logging operations have become a routine part of oil-well drilling practices. In recent years, rapid strides have been made in the development of logging techniques, and many new methods have been developed. Periodically, the technical literature has adequately presented detailed information on such methods for the skilled geologist or engineer. But very little is written in semi-technical language for that group of persons concerned with logs but unable to study the technical literature.

The series beginning here offers a summarized logging guide primarily for those individuals. It may also serve as a reference manual for all persons concerned with log interpretation.

ELECTRICAL and radioactivity logs may be subdivided into two categories each. Electrical logs include spontaneous-potential and resistivity curves, while radioactivity logs include gamma-ray and neutron curves.

The resistivity curves of electrical logs may be further subdivided into several types differing from each other by the sort of information revealed and by the nature and arrangement of the investigating devices employed. The following types* of resistivity curves are recorded: short-normal, long-normal, lateral, limestone lateral, Laterolog, MicroLog, Microlaterolog, and induction log.

S.P. Curve

The spontaneous-potential curve (S.P. curve) is the voltage graph shown on the left-hand track of an electrical log. The potential is measured in millivolts.

The curve differentiates between shale zones and nonshale zones. The S.P. voltage is the sum of several electrical potentials occurring naturally in and adjacent to the bore hole. The potentials are both electrochemical and electrokinetic in character.

... Electrochemical potentials arise from a difference in concentrations of electrolytes (essentially aqueous sodium chloride or salt solutions) which are separated by a semipermeable barrier. The presence of shale is a prerequisite for current flow, so the electrochemical component of the S.P. voltage is a differentiating factor between shales and nonshales.

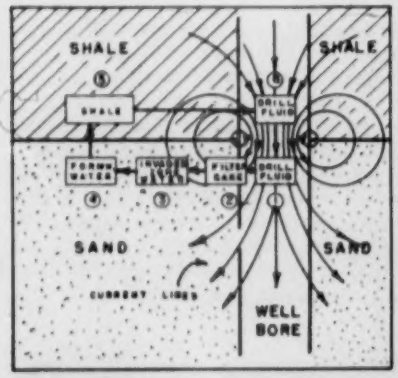
At a fixed temperature, the electrochemical potential is mathematically expressed as:

$$E_1 = K \log (a_1/a_2) \qquad (1)$$

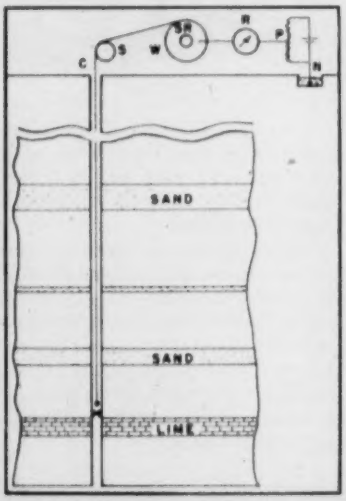
where E_1 is the electrochemical potential in millivolts, K is a constant,

*Electrical-log nomenclature used here is that of Schlumberger Well Surveying Corp. Other service companies employ different nomenclature.

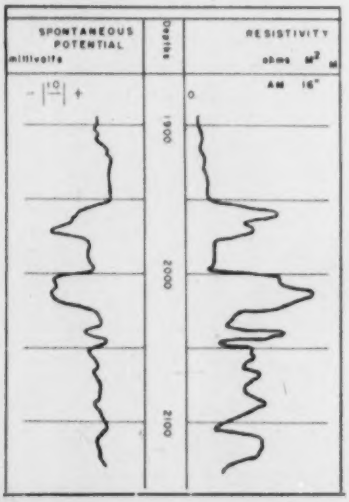
Author is in charge of secondary-recovery operations for Slick Oil Co., San Antonio.



WHERE S.P. voltage arises. Each number represents a voltage change. Fig. 1.



WELL ELECTRODE measures mud potential resulting from current flow. Fig. 2.



NEGATIVE mud potential gives kick to the left at shale-free permeable beds. Fig. 3.

- **Line pressure is isolated in the conduit while valve is open or closed**
- **Bubble-tight seal on both sides of the gate may be checked after each operation**

Grove Seal-O-Ring Gate Valves with the exclusive new fabricated body design offer an extra wide margin of safety, because line pressure is isolated in the conduit when the gate is either full open or closed. This means that the body is required only as a framework for the simple operating mechanism, and to prevent loss of fluid or gas while gate is being moved. When gate is open or closed, body may be drained or vented to atmosphere – and integrity of both upstream and downstream seals may be checked by means of a simple tell-tale valve on the body. For 2" to 36" size requirements for all wanted working pressures.

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GROVE (SEAL-O-RING) GROVE SIMPLICITY ACCURACY SAFETY

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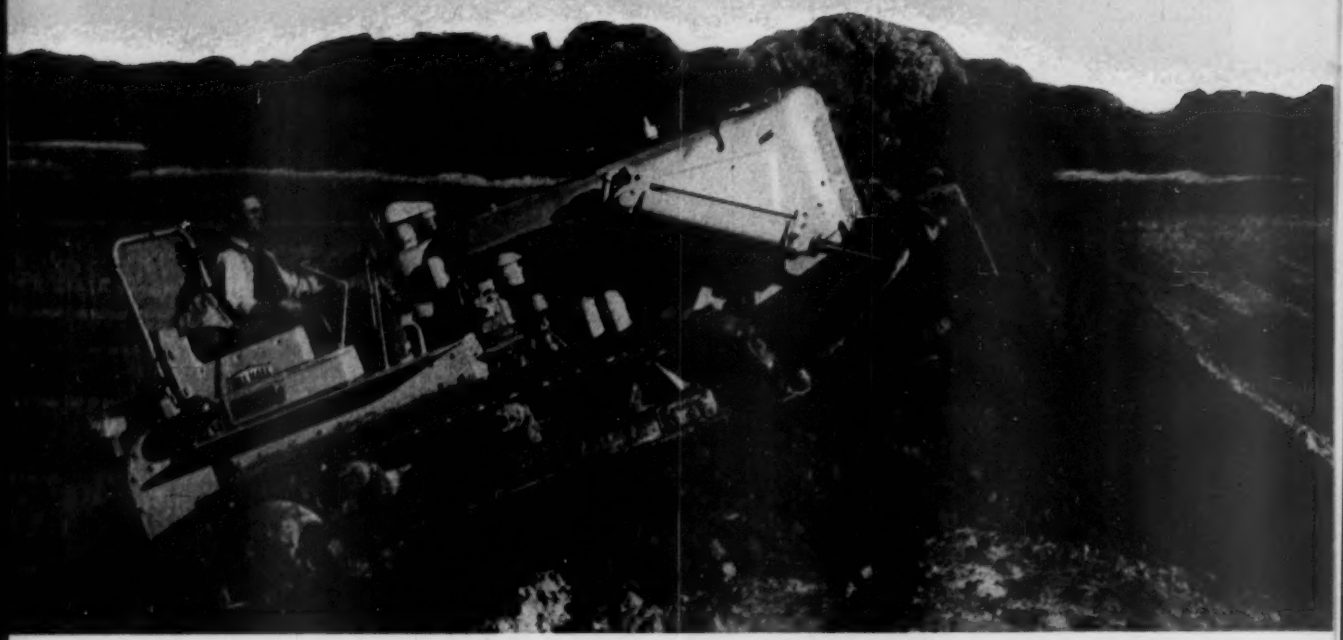

Bill Hall Construction Co., Duncan, Okla., had two CAT* D6 Tractors when it began preparing sites in 1944. Today it has 20 of these big yellow machines in its all-Caterpillar fleet.

These machines recommend themselves in the oilfields. From site preparation to cleaning up, you never run out of jobs for the D6. Bill Hall uses these big yellow workhorses to clear brush, level sites, build roads, dig and fill pits, dig gathering line trenches, dike storage tank areas and level finished well sites.

The D6, like all Cat-built equipment, was built for hard and heavy use in rugged oil patches. The great new oil clutch is an example. Not only does it add dependability but it reduces service and maintenance costs. Clutch adjustments are rarely needed. Disc replacements are required no more frequently than engine overhauls.

And the protected final drives and track rollers of the D6 keep dust, mud and water out, lubricant in. The sure-footed traction of the machine uses maximum engine power to do many jobs quickly and inexpensively. And you have a choice of two gauges—60-inch or 74-inch.

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Caterpillar Tractor Co., Peoria, Illinois, U.S.A.

CATERPILLAR*

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NAME THE DATE... YOUR DEALER WILL DEMONSTRATE

a_1 is the activity (equal to concentration at low concentrations) of sodium chloride on one side of the semipermeable barrier, and a_2 is the activity of sodium chloride on the other side of the semipermeable barrier.

. . . Electrokinetic potentials arise from the flow of an electrolyte (mud filtrate) through permeable media. Mud-column pressure is greater than formation pressure to restrain formation fluid.

At a permeable zone, a mud cake forms on the wall of the bore-hole and mud filtrate slowly streams into the formation. This condition is responsible for the streaming or electrokinetic component of the S.P. voltage. The electrokinetic potential is mathematically expressed as:

$$E_2 = k\ P^y \qquad (2)$$

where E_2 is the electrokinetic potential in millivolts, P is the pressure differential across the mud cake in pounds per square inch, k is a constant depending on temperature and mud resistivity, and y is a constant depending on temperature.

The total S.P. voltage is the sum of the electrochemical and electrokinetic components, or

$$E_{total} = E_1 + E_2 \qquad (3)$$

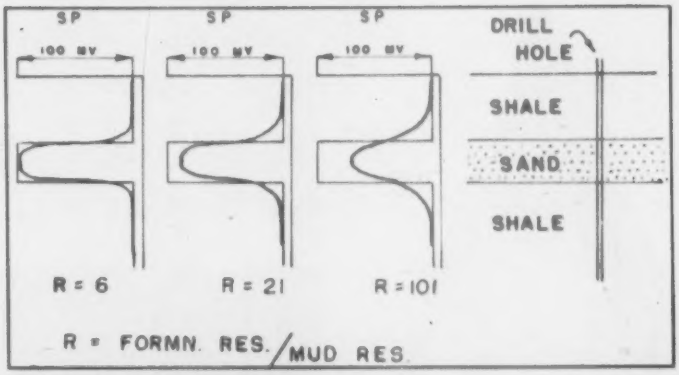
In most cases, the electrochemical component of the S.P. voltage is considerably greater than the electrokinetic component.

Down-the-hole conditions are illustrated by Fig. 1. Electrochemical potentials occur between zones 3 and 4, 4 and 5, and 5 and 6. And an electrokinetic potential may occur across the mud cake at zone 2.

The sum of these potentials produces an electric-current flow from the shale, through the mud column, across the sand, and back into the shale.

The current-lines shown on Fig. 1 are most intense in the well bore at the sand-shale contact plane. According to Ohm's law, current flowing in the resistive mud column causes bore-hole voltage drops. These voltage changes are recorded on the S.P. curve.

Measuring device . . . The method of measuring S.P. voltages is shown schematically in Fig. 2, where M and N are lead electrodes. M is attached to the end of the insulated conductor cable C which passes over sheave S and is wound on a winch (not shown). The winch is equipped with a slip-ring connection for establishing electrical contact through a measuring and recording circuit (not shown) with N. N is placed in the mud pit and attached to the casing or otherwise grounded to complete the electrical circuit.



DECREASING MUD RESISTIVITY reduces voltage drop in mud column, increases formation drop, and decreases S.P. Fig. 4.

The voltage recorded on the S.P. curve is the difference in potential between electrodes M and N. As M passes permeable beds of low shale content, its potential becomes negative with respect to N, and the S.P. voltage increases. This increase is recorded on the S.P. curve as a deflection to the left (Fig. 3).

Because of the many factors affecting the S.P. voltage, its quantitative interpretation is uncertain. However, its qualitative implications are quite important. Some factors affecting the shape and amplitude of the curve at a particular permeable zone are: (a) resistivities of the permeable zone, of the surrounding formations, and of the drilling mud; (b) differential pressure across the mud cake at the permeable zone; (c) thickness of the permeable zone; (d) depth of penetration of mud filtrate into the permeable zone; and (e) shale content of the permeable zone. The effects of these factors are briefly discussed below.

Resistivities of the permeable zone, surrounding formations, and drilling mud . . . In Fig. 1 it was shown that electrochemical potentials may exist at several points. Equation 1 relating electrochemical potential to the activities of salt solutions on two sides of a semipermeable barrier applies to conditions at these points.

For conditions prevailing between points 3 and 4 of Fig. 1, equation 1 becomes:

$$E_{mf-fw} = K \log (a_{fw}/a_{mf}) \qquad (4)$$

where: E_{mf-fw} is the electrochemical potential between the mud filtrate and the formation water in millivolts; a_{fw} is the activity of sodium chloride in the formation water; and a_{mf} is the activity of sodium chloride in the mud filtrate.

The equation may be similarly written for other contact planes of Fig. 1. It should be remembered that activity as used here is inversely related to resistivity. As the activity of salt in a saline solution increases, the electrical resistivity of that solution decreases.

Equation 4 shows that as a_{mf} increases, the ratio (a_{fw}/a_{mf}) decreases. The value of E_{mf-fw} decreases too, and so the presence of salt in the drilling mud decreases the amplitude of the S.P. curve.

Where the mud is more saline than the formation water, the ratio (a_{fw}/a_{mf}) becomes less than unity. And the deflection of the curve then is reversed.

This situation prevails where freshwater sands are drilled with brackish or salty muds. Conversely, equation 4 shows that the deflection of the S.P. curve is more pronounced where sands containing salt water (free or connate) are drilled with low-salinity muds. The effect of the ratio (formation resistivity/mud resistivity) on the amplitude and shape of the S.P. curve is shown in Fig. 4.

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IMPROVING DISTILLATE FUELS—1

Storage Stability: The Sludge Problem

by J. P. Kirchner, D. P. Osterhout, and W. R. Schwindeman

THE performance of distillate fuels in household oil burners and diesel engines has been limited by sludge deposits and gel-like deposits. Sludge formation results from fuel-oil instability. The transparent gel-like deposits result from reaction of mercaptan sulfur compounds in the fuel with the copper in the brass parts of the fuel system.

This series of the Refiner's Notebook deals with the effect of additives and refining methods on fuel instability and mercaptide gel formation.

- The sludge problem has been remedied by the use of antiscreen-clogging additives. Storage stability of the fuel has been improved by sediment inhibitors and better refining procedures.
- Refining techniques are also effective in removing the mercaptans or converting them to harmless compounds. The copper mercaptide gel problems may also be remedied in the future by an additive mixture which shows promise.
- In many cases storage stability may be improved and mercaptans removed by the same refining process. Use of additives together with proper treating process eliminates both problems.

Fuel-Oil Sludge

In the past 10 years, there has been increased demand for higher-octane gasoline and for distillate fuels. This has brought about shifts in refinery operation which adversely affected the stability of distillate fuels. Greater cracking severity and the cracking of higher-boiling fractions of the crude have been practiced. This has resulted in greater content of sulfur and nitrogen compounds in distillate fuel stocks and poorer storage stability.

Distillate fuels often form substantial amounts of fuel-insoluble organic sediment during storage. This sediment mixes with the fuel, dirt, and water present in the distribution system and forms fuel-oil sludge. The sludge plugs filters and screens in the consumer equipment and prevents the flow of fuel.

Authors are with Socony Mobil Oil Co., Paulsboro, N. J. From paper presented at A.S.M.E. meeting, Chicago.

Except in rare instances, fuel-system filter stoppage is due primarily to fuel-oil sludge and not to the organic sediment in itself. The sediment is the key to the trouble, however, since it stabilizes the sludge and acts as the binder which holds the balance of the ingredients in a mayonnaise-like emulsion of oil in water.

This sludge is formed in storage tanks where the ingredients are mixed by the agitation which occurs as the tank is filled. The sludge is a stable emulsion in contact with either fuel or water. Unless disturbed, it is found floating at the interface between the water and fuel in the storage tank.

The composition of a typical fuel-oil sludge is: water, weight per cent, 50; fuel, 40; rust and dirt, 8; and organic sediment, 2.

Sediment and sludge . . . The sediment accounts for only 2 per cent of the weight of the sludge. But a large amount of sludge can form from a relatively small amount of organic sediment.

This is illustrated in Fig. 1 which shows the amount of dry sediment formed in field storage (on the East Coast) with increasing time. An additional scale is given on the right side of the figure which converts the weight of dry sediment into pounds of sludge which could form in a standard distribution system.

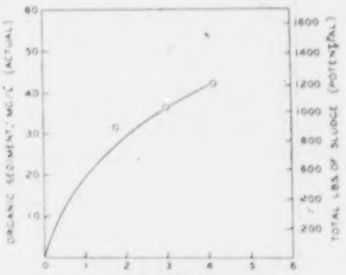


FIG. 1—Field tank-storage test of No. 2 fuel oil, 1,700 bbl. stored.

Note that this unstable fuel formed 40 mg. per liter of sediment after 4 months of storage, and that this much dry sediment precipitated from the 1,700 bbl. of fuel in the tank could form over half a ton of sludge under the proper conditions.

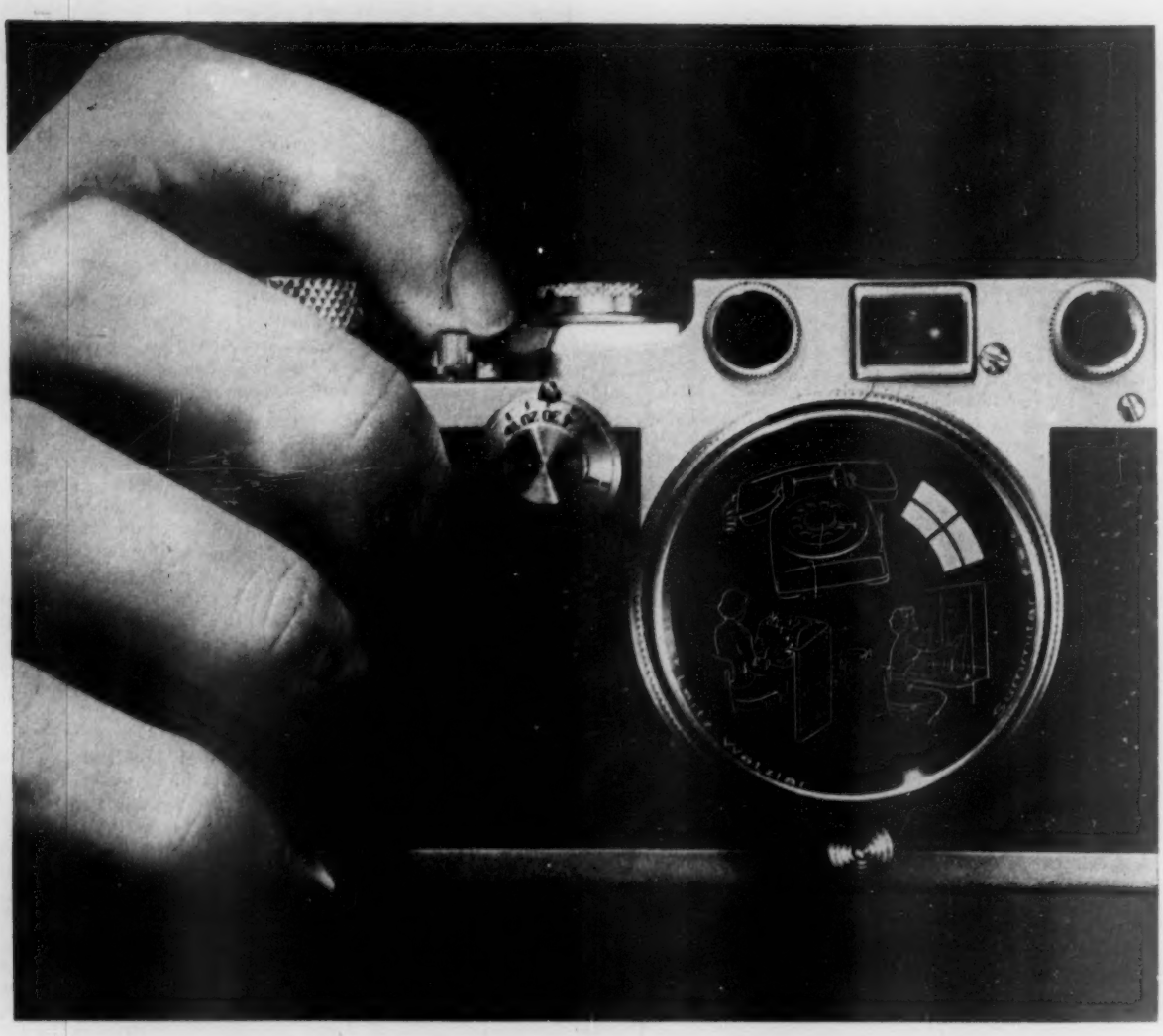
It is difficult to determine how much sludge can be tolerated in a distribution system before trouble occurs. Furthermore, since the sludge floats at the interface in the storage tank, it is stirred up and delivered with the fuel in a random fashion. Thus outbreaks of sludge trouble are often sporadic.

Minimize sludge problems . . . The elimination of tank water bottoms will help. But it will not remove the problem entirely. Some water will still be present due to (1) the precipitation of dissolved water from the fuel itself, and (2) the condensation of moisture from the atmosphere in the tank.

Annual cleaning of storage tanks, inspection to find any sludge present in the system, and installation of filters at loading racks and major storage terminals will all help. But the sludge will eventually form right in the customer's fuel tank and trouble will still occur in spite of all this effort. To effect a permanent solution, more thorough measures must be employed.

Solving the sludge problem . . . At the present time there are two ways in which the sludge problem can be solved. The first is to use an additive which will disperse the sludge so that it will pass through the filters and be burned with the fuel. The second is to use an additive or refining process which will stabilize the fuel and prevent sediment formation.

In many instances, a combination of these techniques provides the most economical solution to the sludge problem. The detailed solutions are discussed in later installments of this series.



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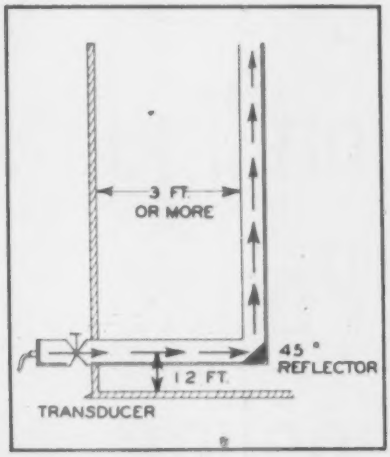
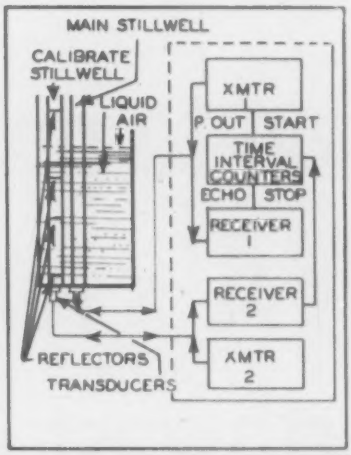
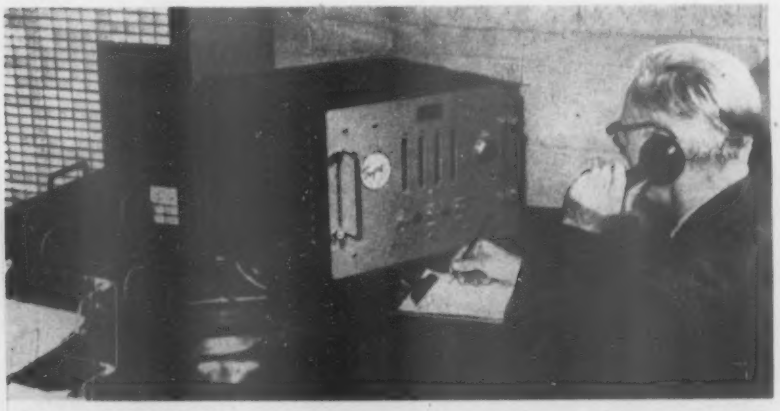


RIGHT-ANGLE still well allows mounting of transducer outside of tank shell and above ground. Fig. 1.



OPERATING principles of echo gage. Calibrating system automatically adjusts for changes in temperature. Fig. 2.



DECADE INDICATOR for ultrasonic gage system shows tank level to nearest .01 ft. Indicator can handle any number of tanks within 2,000 ft. radius. Control box at left switches to various tank units.

How echo-type gages measure tank levels

Bounce a sound wave off the surface of liquid in a tank and measure the time between sending and receiving the impulse. That's basically how this tank gage works. It's accurate and has no moving parts. Exactly how does it work? This article gives the details.

A COMPLETELY automatic ultrasonic system, free from floats or other moving parts, has proved its effectiveness for tank gaging. The system uses echo-sounding techniques and periodically sends an ultrasonic pulse to the liquid surface where it is reflected as an echo. The time required for the pulse to travel the path and back is measured and converted to represent liquid level in feet and decimal fractions, accurate to 0.01 ft.

The system is completely safe since no direct current flows in or around the tanks being gaged or in the coaxial cables forming the only connection between the indicators and the tanks themselves. Alternating-current energy is far below that required to ignite gasoline fumes under any condition, so the system is safe for use in explosive tank areas.

System components . . . Basically, the system consists of: (1) one or more transmitters which periodically send a sound pulse to the surface; (2) one or more receivers which amplify the returning echo; and (3) a time-interval counter that measures the time elapsing between transmission of a pulse and receipt of the corresponding echo. Liquid level, to 0.01 ft., is then automatically shown on the front panel of an accompanying indicator. The indicator can be located at any convenient distance, 2,000 ft. or more, from the tank itself.

Any number of tanks within a 2,000-ft. radius can be gaged from a common indicator. Also, an accessory tape-printer recorder will permanently record indicator readings, either on demand or continuously.

The tape printer will identify the tank being gaged by its serial number next to the corresponding level reading. It can be arranged to record levels of all tanks in a large farm in any desired sequence. These readings are also adaptable to telemetering over any conventional wire or radio channel.

Two still-well pipe assemblies are required in the tank. One is fitted with internal protuberances which reflect back echoes used for calibration. The other still well confines sound pulses of the main transducer to a small part of the tank, simplifying placing of tank elements with respect to nearby reflecting structural members.

The still wells may be mounted within the tank or on the outside shell. For outside mounting, taps are provided at frequent intervals to assure that still-well and tank levels will stay equal.

Use of internal still wells reduces turbulence effects and confines the sound path to a small part of the tank. The standard still-well pipe is acoustically treated internally and will stand temperatures up to 90° C.

Sometimes it may be more convenient or necessary to use external still wells. In this case, valves used in the taps to the main tank facilitate cleaning of the transducers. This may be required from time to time to remove debris which settles out of the oil.

If for any reason the still wells can-

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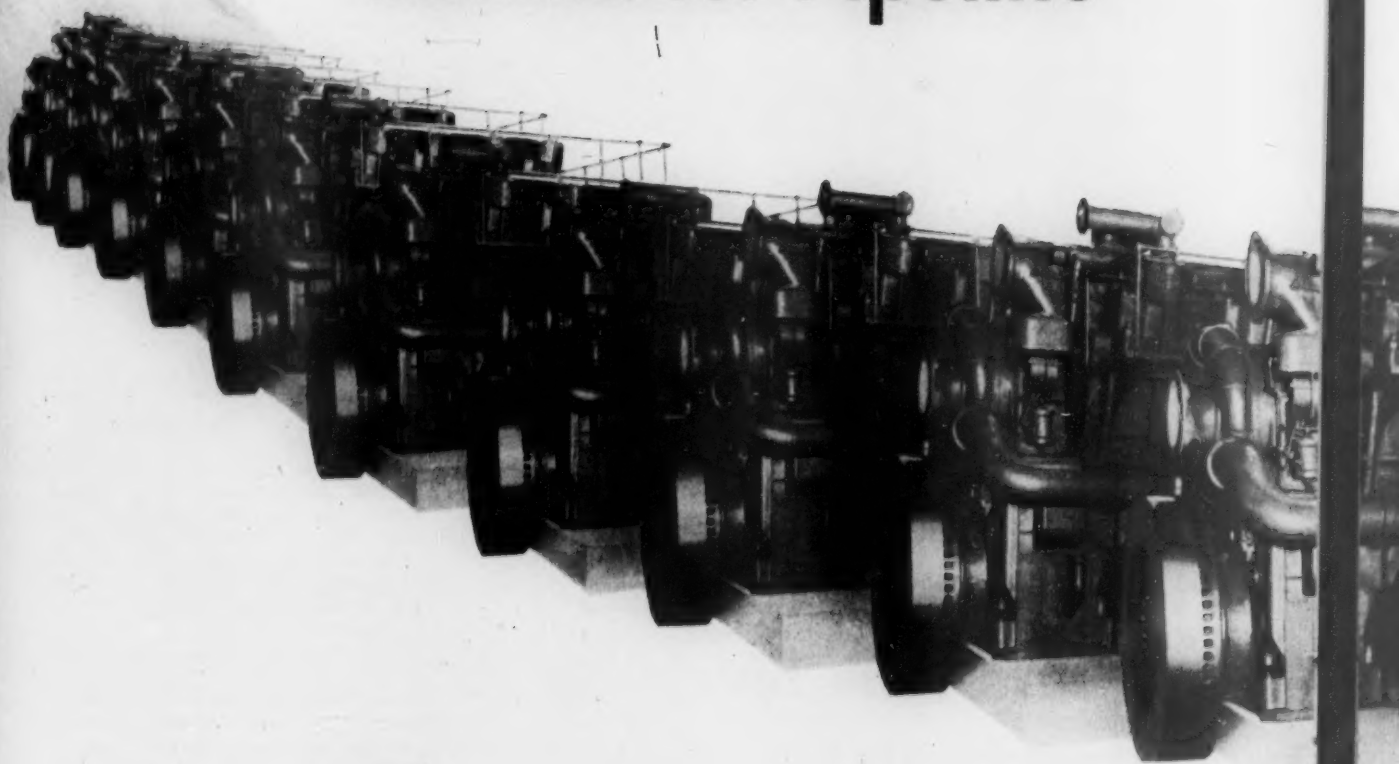

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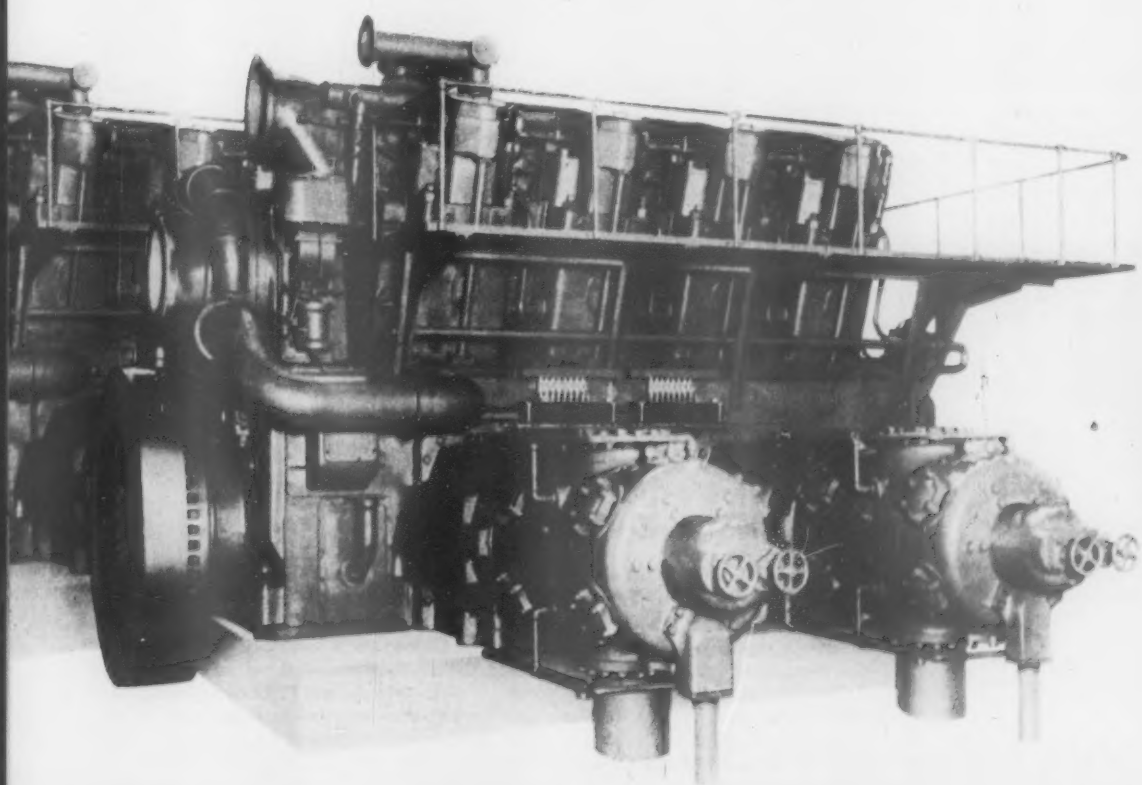

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PIPELINE PATROL

not be installed so as to have the transducers mounted in the tank bottom facing upwards, a right-angle still well with a 45° reflector can be used. This allows the transducers to be mounted outside of and at the base of the shell. Fig. 1 shows such a mounting.

How the system works . . . One system available is automatically calibrated to compensate for changes in the velocity of sound with temperature in different liquids. It consists of an indicator and two transducers in each tank being gaged. The transducers, with proper protection, are installed at the bottom of the tank and are the only transmitting and receiving devices to come in contact with the liquid. Fig. 2 shows the system schematically.

One sonic gage measures the surface height; the other measures the spacing between a series of acoustic reflectors placed along the sound path of the second transducer. Output of the latter gage electronically calibrates the companion system measuring the surface level.

Transmitter 1, receiver 1, a transducer, and the time-interval counters are called the "main" system which gages the surface level. The second, or "calibrate" system, consists of transmitter 2 (which directs a sound pulse along the path fitted with reflectors) and receiver 2 which amplifies the echoes. The amplified reflector echoes are applied to the time-interval counters where they electrically calibrate the main system.

The transducers are pulsed in synchronism, and the echoes derived from the reflectors are composed in phase with similarly spaced pulses generated within the indicator itself by a series of frequency dividers energized by the timing oscillator. The oscillator is started and stopped by a multivibrator gate operative only during the interval of time between transmission of a pulse by the main transducer and receipt of the corresponding echo.

The period of each cycle of the timing oscillator is chosen to equal the time required for a sound pulse to travel 0.01 ft. up and back through a particular liquid. So the total number of cycles in the interval between transmission and return of an echo equals the actual level in hundredths of a foot. This information is translated to a liquid-level reading on the decade counter of the indicator.

The transmitted pulse train at 400 kc. is transmitted at a rate of 20 times per second. Each pulse is 40 microseconds in duration, and the calibrating pulse is identical to the indicating pulse. The reflectors, located in the calibrating system, provide pulses to adjust the timing frequency to correspond exactly to velocity of propagation in the particular liquid.

Depending on the size of the tank, reflectors are spaced either 4 or 8 ft. apart starting from the first or closest reflector. This first transducer is usually 2 ft. away from the active face of the "calibrate" transducer. These spacings are ordinarily close enough to insure the adequate averaging of small differences in velocity which may be caused, for example, by heavier liquids settling to the bottom and by temperature gradients existing within the containers.

The indicator, which can be located at a considerable distance from the tank, is housed in a table-mounting cabinet. The unit is mounted on slide rails for ease of inspection and maintenance. The system operates from 117-volt, 60-cycle, single-phase power and consumes 270 watts.

The system described here is made by Bogue Electric Manufacturing Co.

Pipeline bridge spans 2,450 ft.

A PIPELINE suspension bridge carrying two 30-in. gas lines across the Missouri River near Plattsmouth, Neb., is now in service for Northern Natural Gas Co.

The bridge is the biggest on Northern's system and has the longest single span of any pipeline bridge on the Missouri River. The main span is 1,500 ft. from tower to tower. A side span of 750 ft. carries the pipeline over flood levees on the Iowa side, and a truss span adds 154 ft. on Nebraska side. The crossing cost over 1 million dollars.

Matthews and Kenan, engineers of San Antonio, designed the bridge to meet Northern's requirements. Pittsburgh-Des Moines Steel Co. of Dallas built the bridge.

Construction kicked off the middle of 1954 with the sinking of four caissons—two on the Nebraska side of the river and two on the Iowa side. They were sunk to bedrock to provide a base for the two piers which support the two main towers. Caisson construction was necessary in order to dig through stratified rock to a solid bedrock footing. Excavation was done inside of concrete rings 24 ft. in diameter.

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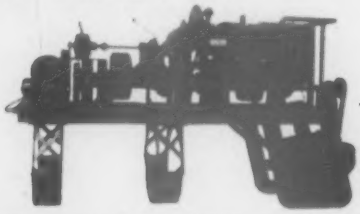

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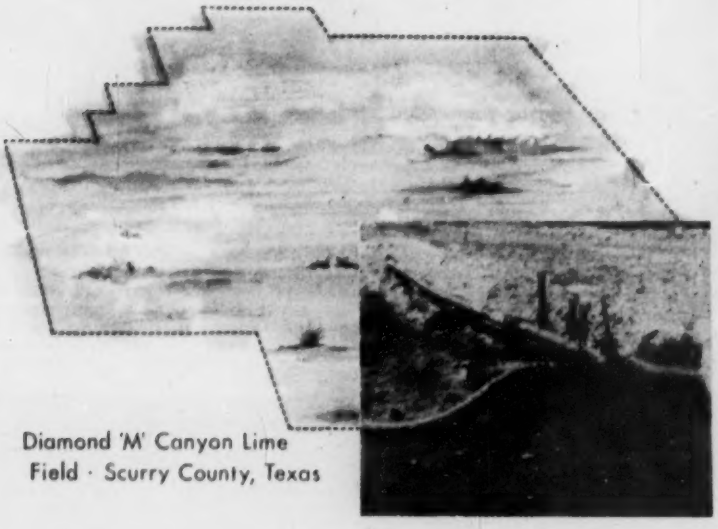
INTERNAL COATING STOPS CORROSION in waterflood lines in Canyon Lime Field . .



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Pipeline Patrol

TWIN 30-in. gas lines cross the Missouri River near Plattsmouth, Neb., on this half-mile-long suspension bridge. It cost more than 1 million dollars.

tled downward into the earth of its own weight. Other rings were placed on top as the preceding ones sank. The rings were sealed and air pressure brought up to prevent the entrance of water. Workers entered the caissons through pressure chambers and excavated material was removed through a similar chamber.

On the Nebraska side, caissons went down to 70 ft. below ground level and air pressure was raised to 22 psi. On the Iowa side, caissons went 95 ft. down and pressure was raised to 35 psi. When excavation was completed, concrete seals were poured into the caissons. The substructure required 1,820 cu. yd. of concrete on the Nebraska side and 2,400 cu. yd. on the Iowa side. The caissons were topped with a reinforced concrete block upon which rests the concrete piers and steel towers. The steel towers are 215 ft. high.

The lowest point on the bridge is 70 ft. above standard high water. It allows plenty of room for the largest towboats to pass under the bridge.

BOOK

GEOLOGY AND MINERAL RESOURCES OF HUGHES COUNTY, OKLAHOMA, BULL. 70. Published by Oklahoma Geological Survey, Norman, Okla. 150 pp. $2.10 (Bound in blue cloth, $2.60).

The study of Hughes County by O. D. Weaver, Jr., presents the surface stratigraphy and areal geology and the correlation of the subsurface formations with similar producing areas in Oklahoma and Kansas. Since Hughes County has an annual production of at least 2½ million barrels of oil, the author has included a regional electric-log cross-section through the county showing the major subsurface units.

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PIONEERS

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Though the pieces above are now past history, pioneer days have never ended. We have felt them always with us, here at *H. C. Smith Oil Tool Co.* And our work bears witness to it. Within our 20 years of company life we have helped to pioneer in the development of jet action bits...the first long-tooth bit was ours...the first hole-opener with the reamers above the bit...the first cross-section bit with forged cutter brace and one-piece pin for the strongest construction known.

While we take a natural pride in these developments, we mention them here simply as examples of the design, engineering and construction that have led many operators to agree that "For fast, straight, full-gage hole, You can't beat *H. C. Smith Bits!*"

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Among the Drilling Contractors

Six Drilling Rigs Active In New Citronelle Field

Six rigs now are running in the new Citronelle area, 25 miles north of Mobile, in northern Mobile County, southwestern Alabama.

These include three rigs operated by Zach Brooks Drilling Co., El Dorado, Ark., and one by Drilling & Exploration Co., Inc., Houston; Dixilyn Drilling Co., Odessa, Tex.; and Trans-Tex Drilling Co., Shreveport.

In addition, Justiss-Mears Drilling Co., Jena, La., has a rig getting started on a new wildcat operation 15 miles southeast of Citronelle.

The field, discovered by Zach Brooks Drilling Co. last October, is productive from Lower Cretaceous sands below 10,800 ft. with holes being carried to depths below 11,500 ft.

Brook's rigs include one working for the company's own partnership operations, and two on contract jobs, one for Gulf Refining Co., and the other for Allen Guiberson. Drilling & Exploration Co. and Dixilyn rigs are on Gulf wells. Trans-Tex is drilling for itself.

Golden Meadow Well Service Co. has contracted for another well Shell Oil Co. has scheduled in Main Pass Block 69, in the Gulf of Mexico, off the southeast coast of Plaquemines Parish, Louisiana. It is an 8,100-ft. job, located in Block 81.

The Oil and Gas Journal

"It's a coin-meter box—we pay for the rig as we go along."

C. M. Robertson Drilling Co., Shreveport, has contracted with Gulf Refining Co. for two 5,600-ft. Pettet tests to be drilled in the Mooringsport area, of Caddo Parish, northwestern Louisiana. One, at 1-A Greene-Caddo Levee Board, in 27-20n-16w, is on the southwest flank of the field. The other, at 1-A Lane-Caddo Levee Board, in 24-20n-16w, is on the southeast flank.

Crow Drilling & Production Co., Shreveport, has a new wildcat operation 4 miles northeast of Shelbyville, in Shelby County, eastern Texas. It is a 7,200-ft. Travis Peak test for Crow-Phillips at 1 Childers, in the J. Anderson Survey.

C. B. Webster Drilling Co., Houston, is keeping a rig working for Southern Natural Gas Co. in the Franklin area, St. Mary Parish, Louisiana Gulf Coast. Latest job is at 5 Godchaux et al, in 37-15s-9e. It will test the field's pay zones to 12,000 ft.

J. C. Reese Drilling Co., Stephens, Ark., is contractor on a new 2,450-ft. Blossom test T. A. Crockett and Howard Bradley, of Magnolia, Ark., are starting at a step-out location south of production on the west edge of the old Smackover field, in Ouachita County, Arkansas.

G. I. Cobb, Kilgore, Tex., has contracted for a shallow, rank wildcat test to be drilled for A. J. Hill, also of Kilgore, in Clay County, in the northeastern corner of Arkansas. Location is for 1 Glasgow, in 19-19n-8e, 2½ miles northeast of Rector, and 8 miles southwest of Piggott. Contract is for 1,600 ft.

Ace Drilling Co., Dallas, will drill a 5,500-ft. Rodessa test 2 miles southwest of Cobb, in Kaufman County, East Texas. It is a contract operation for T. D. Humphreys & Sons, also of Dallas, at 1 Calloway, in the T. Stokeley Survey.

Jett Drilling Co., Shreveport, has two new contract jobs under way. Both are Wilcox tests, one for O. W. Killam, of Laredo, Tex., in West Feliciana Parish, eastern Louisiana, and the other for Cities Service Oil Co., in western Jefferson County, southwestern Mississippi. The West Feliciana job is at 1 Johnson, in 80-2s-2w, about 7 miles

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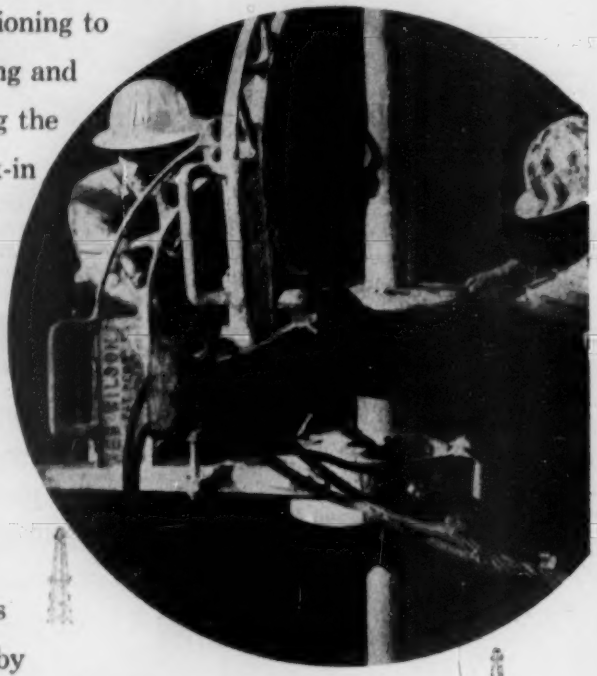

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northeast of Francisville. It is projected to 8,000 ft. The Mississippi job is at 2 Lehman, in 12-9n-1w, in the Fayette area.

Crawford Drilling Co., Shreveport, is keeping a rig busy in new development on the northeast flank of the old Bayou Boullion dome, in Iberville Parish, coastal Louisiana. It is under contract to Glassell & Glassell, also of Shreveport. Latest operation is at 6 Cotton, an 8,700-ft. test.

Green & Heiser Drilling Co., Bakersfield, Calif., is on a new wildcat operation 2 miles northeast of Tejon field, Kern County, California. It is a contract job for Reserve Oil & Gas Co., and listed as Reserve-Union-Kerr 38-24, with location in 24-11-19. The operator plans to carry the hole to "basement," expected about 8,000 ft.

J. C. Crain Drilling Co., Dallas, has a new deep test under way for Southern Petroleum Exploration Co. in the Townsend Wolfcamp area of Lea County, New Mexico. It is at 4 Luck, in 11-16-35. Projected depth is 10,700 ft.

Livermore Drilling Co., Lubbock, Tex., is scheduled for an 11,300-ft. test to be drilled for J. W. Williamson at a wildcat location 9 miles south of Lovington, in Lea County, New Mexico. Location, at 1 Spencer, in 25-17-36, is about 3½ miles south of East Lovington field.

C. E. Bush has contracted for another wildcat test Sam J. Recile has projected in Allen Parish, coastal Louisiana. The new operation, at 1 Quatre, in 9-5s-5w, is 8 miles west of Oberlin, and about 6½ miles northwest of Oberlin field.

Brewster-Bartle Drilling Co. has another deep operation scheduled for Gulf Refining Co. in the Timbalier Bay area, in the coastal water beds of Lafourche Parish, Louisiana. It is a projected 12,500-ft. job, on Gulf's State Lease 1483.

Frio Drilling Co., San Antonio, is drilling for Carrl Oil Co. at a wildcat location 8 miles southeast of Mathis, in western San Patricio County, South Texas. Location is for 1 Johnson. Spot location is in Section 25, George H. Paul Subdivision, J. J. Welder Ranch.

Gracey-Hellum Drilling Co., Houston, has taken on a projected 15,500-ft. wildcat test in Terrebonne Parish, Coastal Louisiana. It is a Union Oil Co. of California water-bed job, located 2 miles south of Lake Pelto field, in the tidal marsh area.

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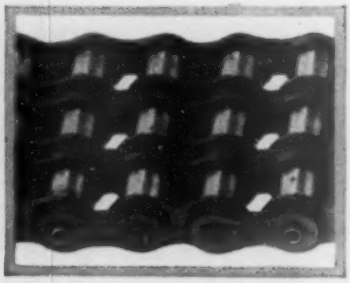

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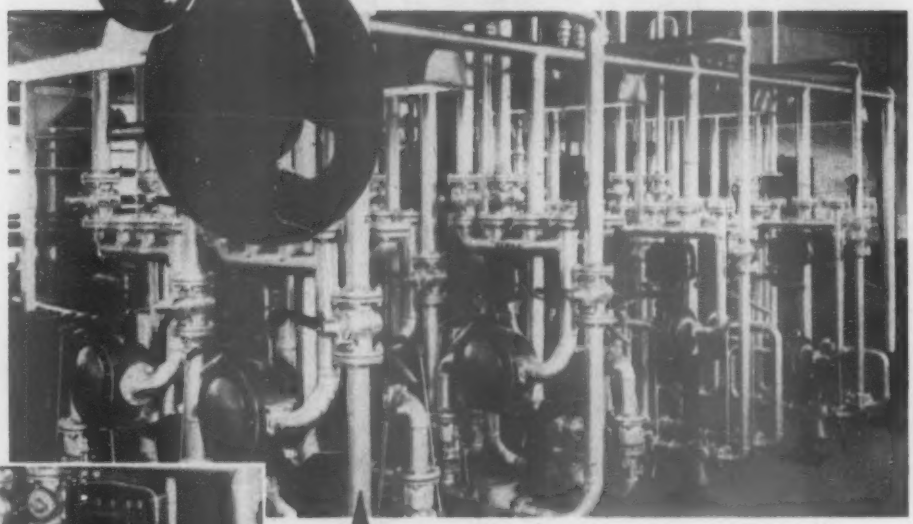

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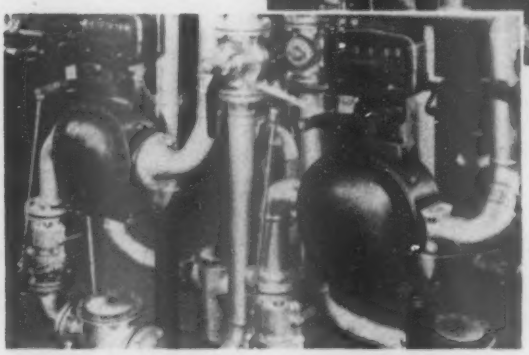

Conventional blending tanks in foreground illustrate complex valve, piping and measuring equipment replaced by automatic metering system.

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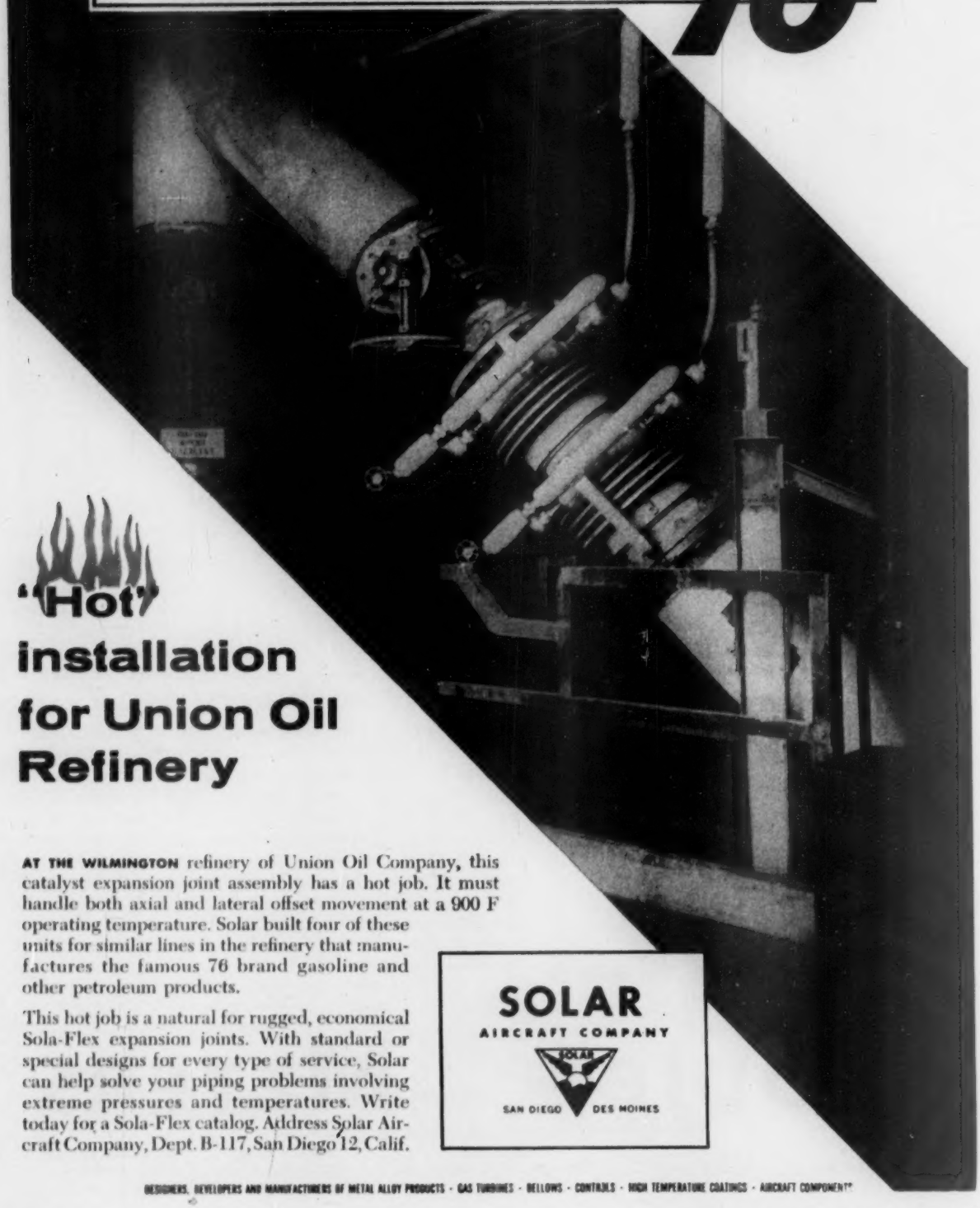

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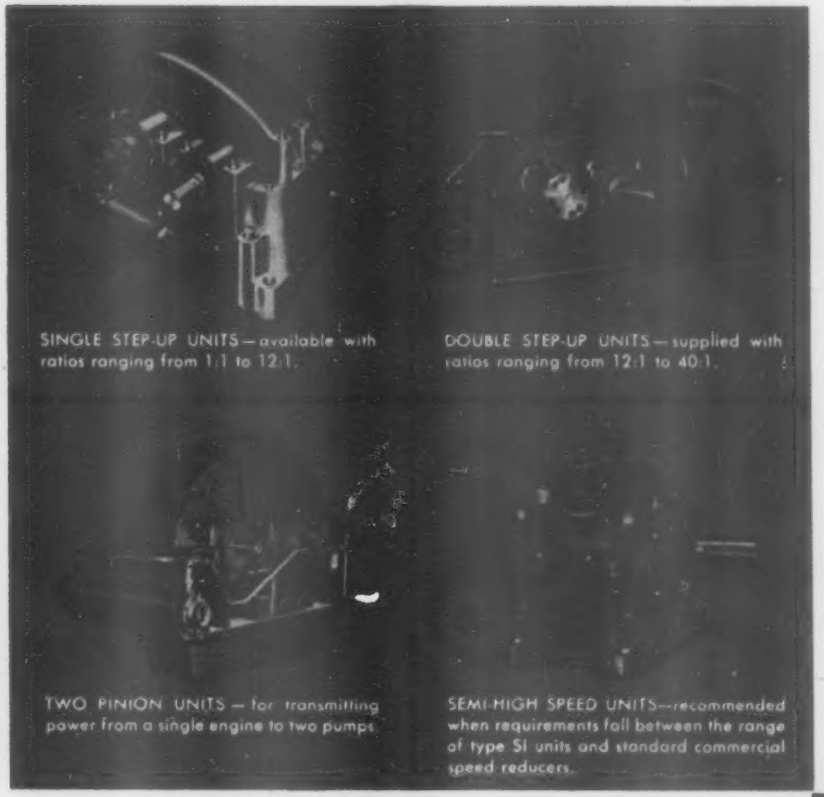

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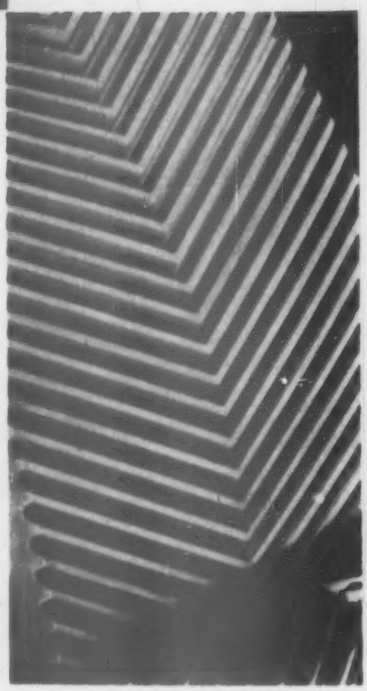

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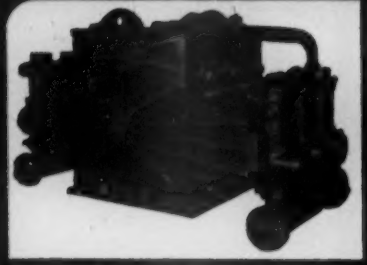

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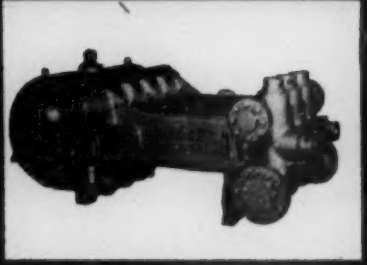

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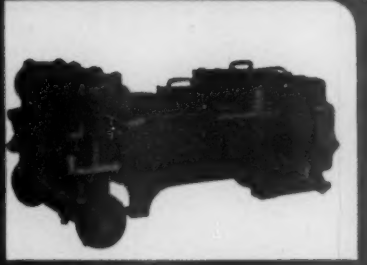
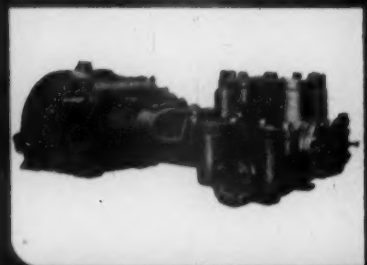
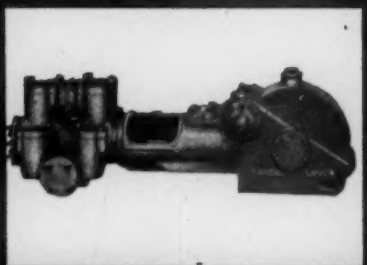


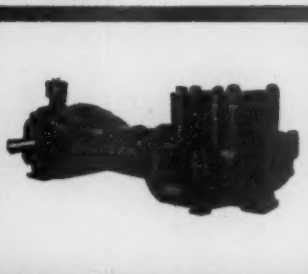
FG-FXG



FF-FXF



LE-LXE



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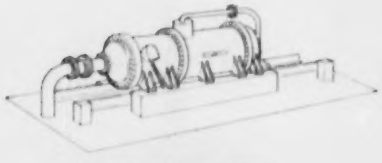

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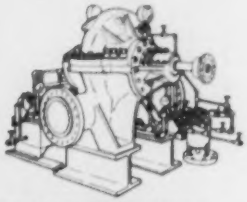

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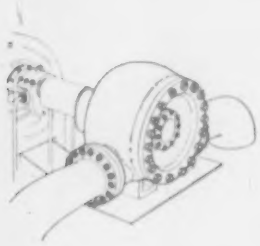

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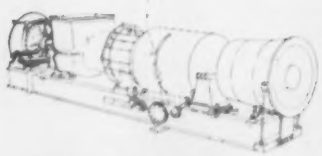

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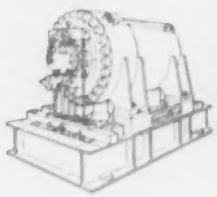

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HIGHEST AWARD IN ENGINEERING

IT'S a repeat contract—and no medal or citation could indicate higher approval of McKee services.

In a half-century of engineering and construction McKee has been awarded over 2600 contracts by discerning businessmen who know what they want and where to get it. More than two-thirds of these were ***repeat contracts.***

This willingness of large companies to repeatedly entrust to McKee the expenditure of millions of dollars in plant investment is proof of the value of McKee engineering and construction.

McKee
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Canada: Arthur G. McKee & Company of Canada, Ltd., 372 Bay St., Toronto

GROWING

STATEMENT OF CONDITION

December 31, 1955

ASSETS

Cash on Hand and Due from Banks		$339,562,399.10
United States Government Obligations	$ 88,587,036.89	
Public Housing Authority Obligations (Fully Guaranteed)	4,845,850.48	
State, County, and Municipal Bonds	18,915,140.38	112,348,027.75
Stock in Federal Reserve Bank		1,500,000.00
Other Bonds		3,522,227.27
Bills of Exchange and Commodity Loans		11,390,783.06
Loans and Discounts		362,054,715.53
Income Accrued		2,136,289.96
Letters of Credit and Acceptances		5,182,599.84
Banking House and Equipment		7,941,748.91
Other Assets		129,950.57
		$845,768,741.99

LIABILITIES

Capital Stock	$ 22,000,000.00	
Surplus Fund	28,000,000.00	
Undivided Profits	4,544,893.72	$ 54,544,893.72
Reserved for Contingencies		5,398,381.53
Reserved for Taxes, Etc.		4,679,551.26
Deferred Income		1,894,272.11
Letters of Credit and Acceptances		5,182,599.84
DEPOSITS:		
Individual	$488,070,967.34	
Banks	273,547,927.17	
U. S. Government	12,450,149.02	774,069,043.53
		$845,768,741.99

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the major difference between banks of today is the way people are treated.

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80 years of growth through service to people

NATIONAL BANK in Dallas

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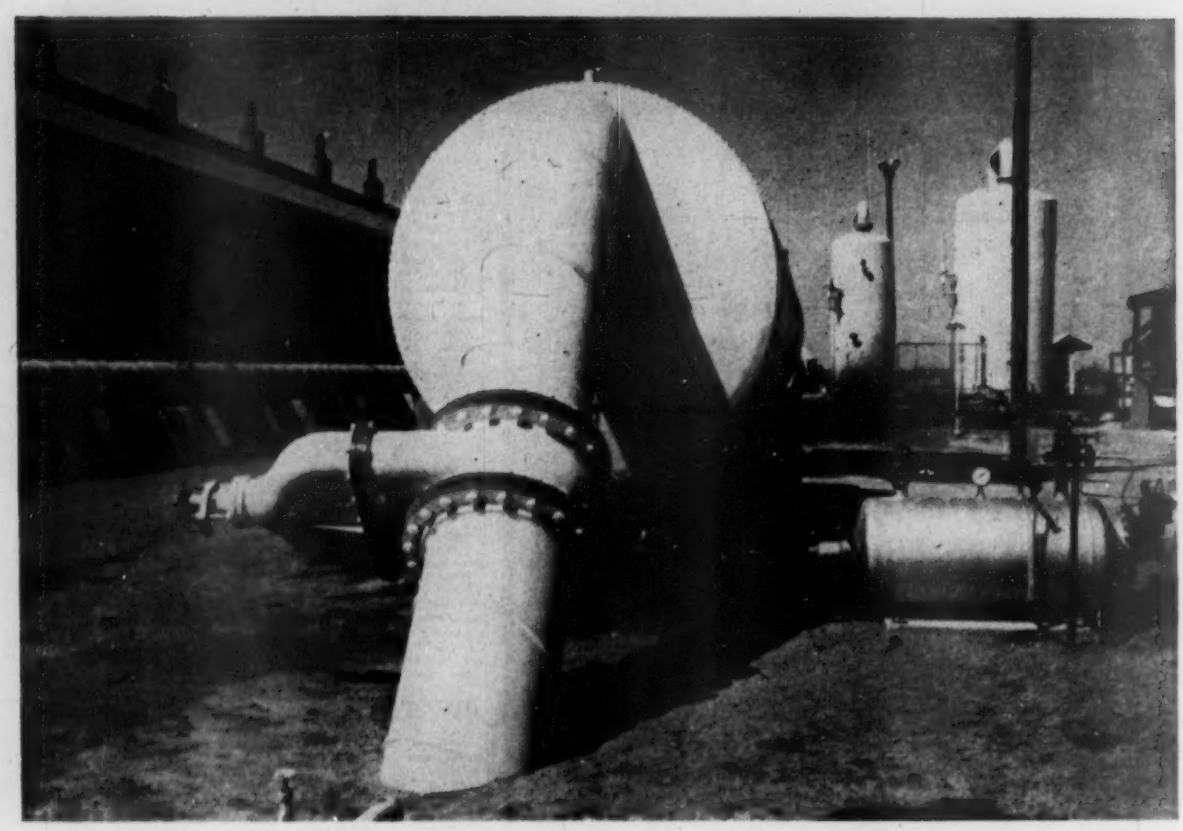
EQUAL OPPORTUNITY TO BUY U.S. SAVINGS BONDS

It's the SPIRAL that Tells the Story



The familiar spiral that distinguishes Naylor from all other pipe in oil field service is more than just an identifying feature. It tells you that the pipe is light in weight and therefore easier and more economical to handle and install. It assures you that Naylor pipe is extra strong and extra safe because the exclusive lockseamed, spiral-welded structure acts as a continuous expansion joint to absorb shock loads, stresses and strains. It is evidence, too, of the greater collapse strength that permits operation of Naylor lines under either vacuum or pressure. Moreover, it's this spiral truss that gives the pipe its true cylindrical form and holds its diameter so accurately.

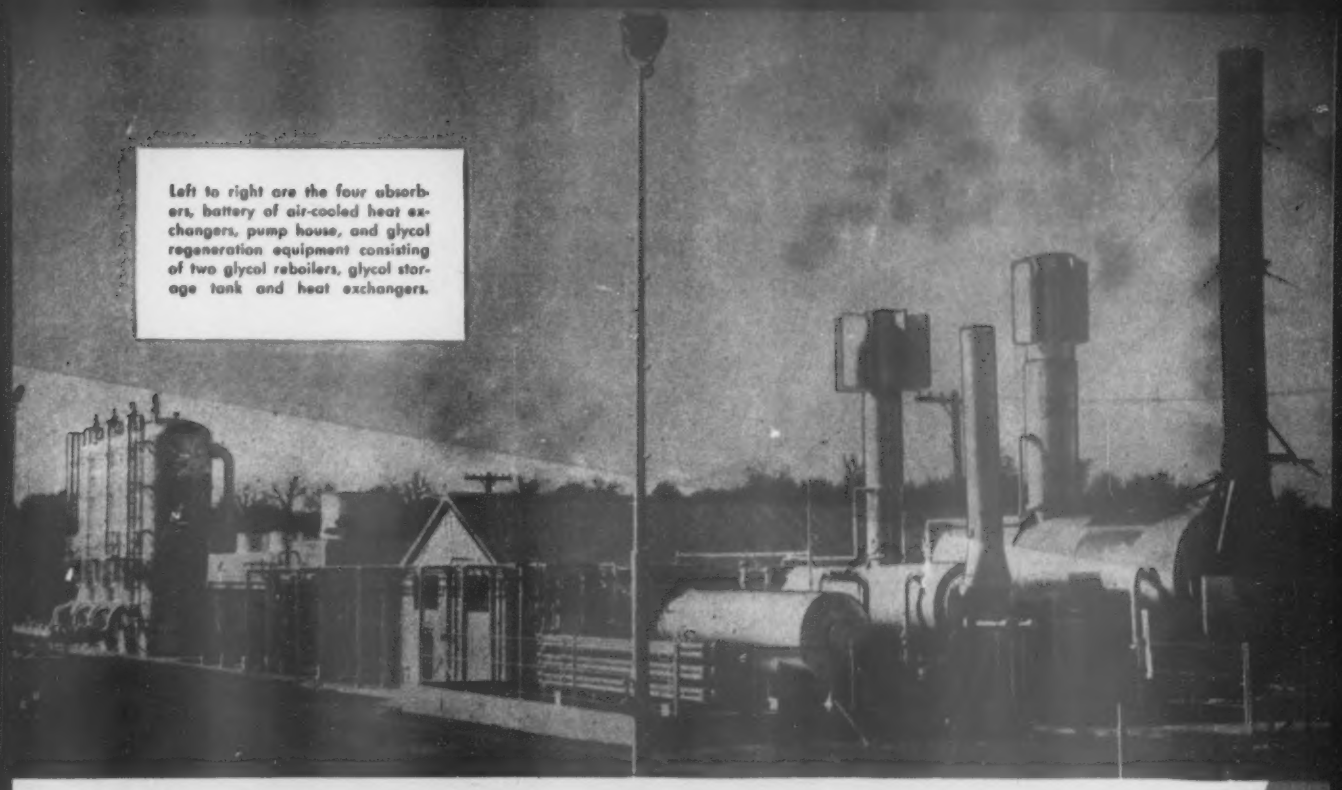
Naylor Spiralweld pipe comes in diameters from 4" to 30", available with standard weight pipe ends for faster, stronger field welds. Write for Bulletin No. 507 or call our distributors.

NAYLOR PIPE

NAYLOR PIPE COMPANY
1232 East 92nd Street
Chicago 19, Illinois

Exclusive Distributors in Mid-Continent and Gulf Coast Areas
MID-CONTINENT SUPPLY CO.
Ft. Worth, Texas and Branches

Eastern U. S. and Foreign Sales Office: 350 Madison Avenue, New York 17, New York



Left to right are the four absorbers, battery of air-cooled heat exchangers, pump house, and glycol regeneration equipment consisting of two glycol reboilers, glycol storage tank and heat exchangers.

560,000,000

SCF OF RESERVOIR GAS PER DAY...

...Can Be Dried In This BS&B Built Dehydration Plant At Depew, Oklahoma!

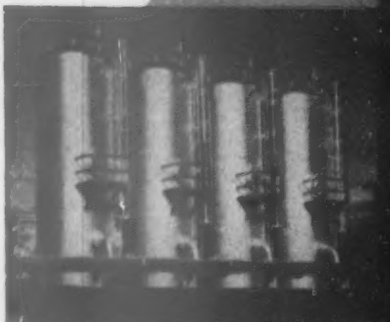
When Oklahoma Natural Gas Co. wanted to double the capacity of their Dehydration Plant serving their 57 billion cubic foot underground gas reservoir near Depew, Oklahoma, they called in BS&B — designers and builders of the original plant.

The job was accomplished within a few months by the addition of two new absorbers, and by doubling the capacity of the cooling system and the glycol reactivation equipment. At the same time, provision was made for additional plant expansion when the need arises.

Present capacity of the plant is 560,000,000 SCF/D at 800 psi pressure. During one month when 4,600,000,000 cubic feet of gas was withdrawn from the reservoir and processed through the new plant, the amount of moisture removed from the gas was equivalent to 20,000 gallons of water!

If you have a dehydration problem —at the well head, at a field processing installation or along the pipeline—why not take advantage of BS&B's many years of successful experience in solving it? Your BS&B Representative will be glad to discuss it with you ... or you may write

OIL & GAS EQUIPMENT DIVISION, DEPT. I A18



Close-up of the four absorbers where the moisture-laden gas gives up its water vapor to a circulating solution of lean triethylene glycol. They are 21 feet high and 8 feet in diameter.

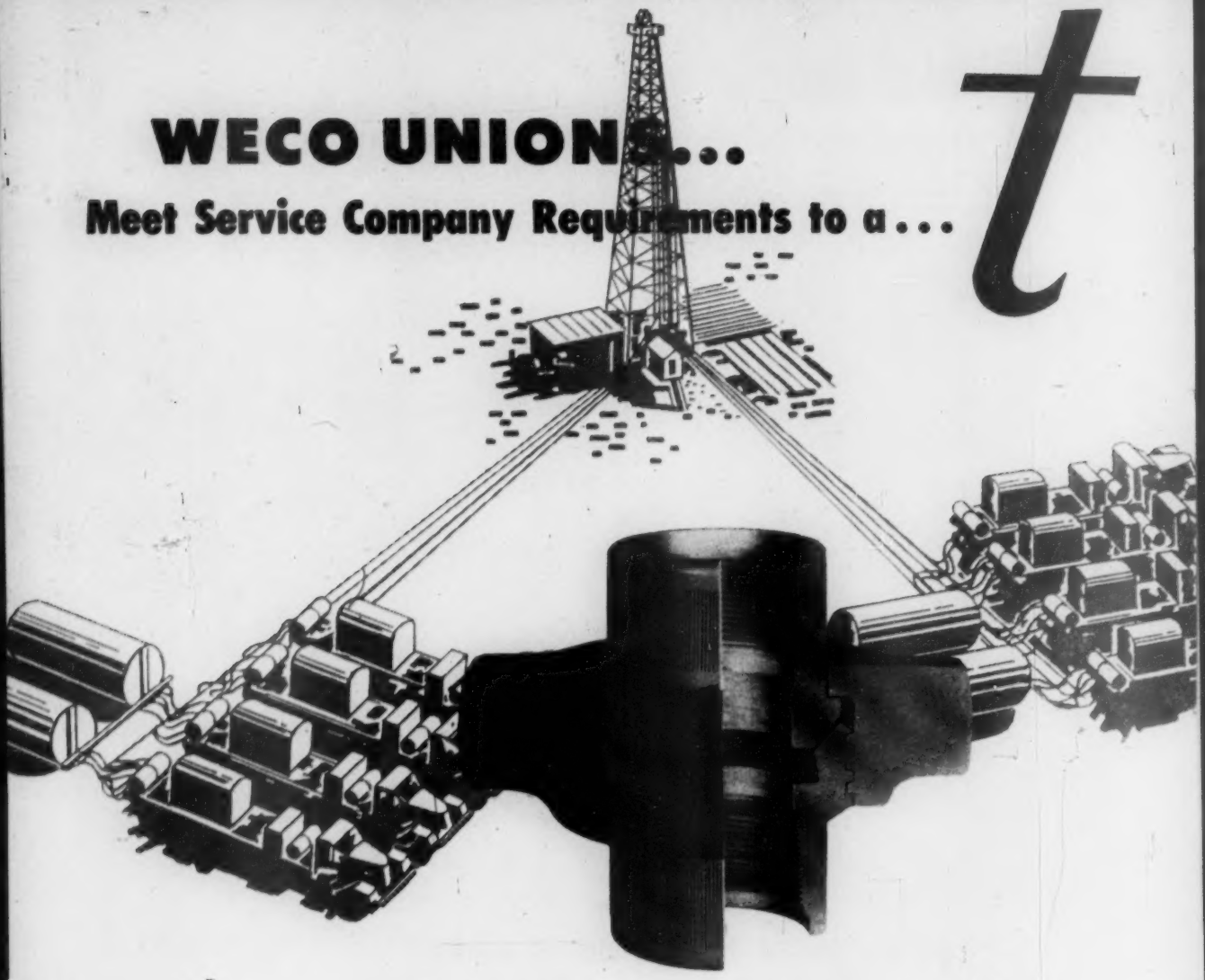
EFFICIENCY BS&B RELIABILITY

BLACK, SIVALLS & BRYSON, INC.

1708 West Main Street Oklahoma City, Oklahoma

WECO UNIONS...

Meet Service Company Requirements to a... t



Fracturing, cementing, and acidizing demand a union that can take it . .

These services require a union that makes-up and breaks-out fast, a union that seals securely on job after job, a union that withstands the severe abrasive action and extremely high pressures and volumes of these operations.

And WECO Unions can take it. Their famous ball and cone seat forms a positive, leak-proof seal . . . their rugged Acme threads make-up and break-out fast . . . their extra tough sub ends and wing nuts take constant abuse—and ask for more—day after day.

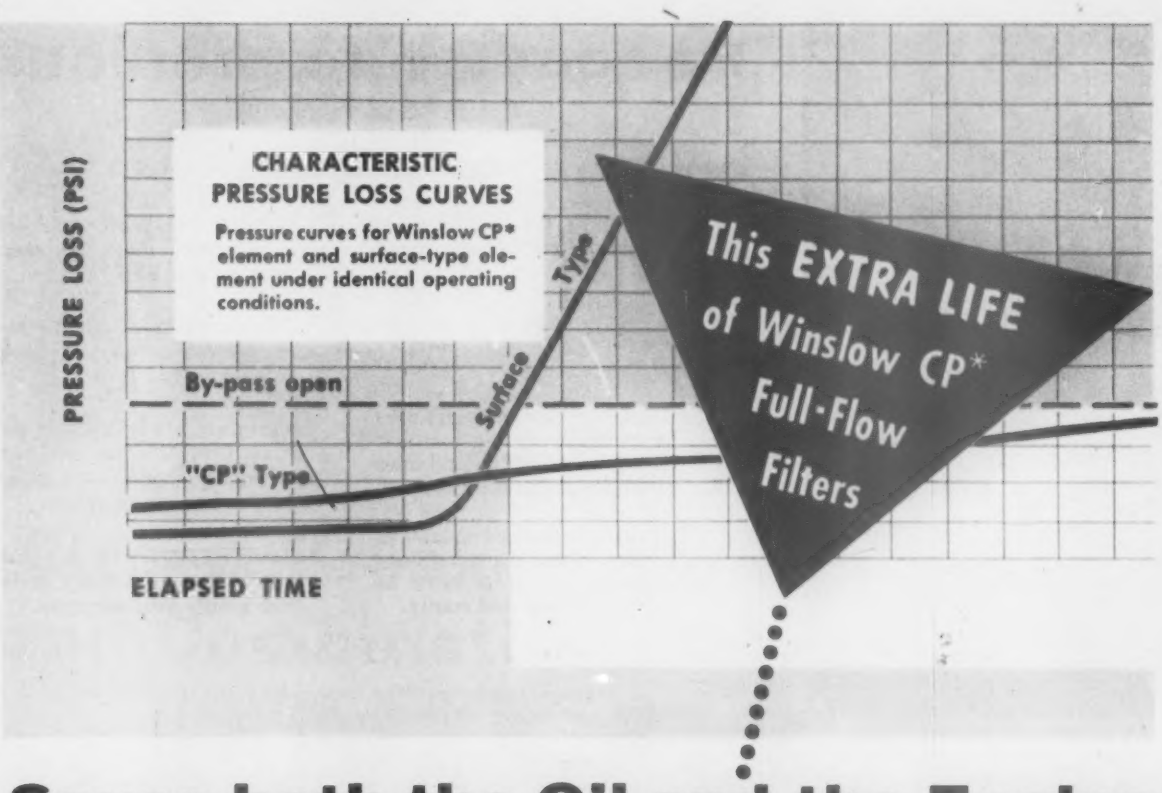
• *Because WECO Unions fulfill these demanding requirements so successfully they are used by the majority of service companies.*

U-16-55

WELL EQUIPMENT MFG. CORP.
HOUSTON, TEXAS

Division of CHIKSAN COMPANY *a subsidiary of*
FOOD MACHINERY AND CHEMICAL CORPORATION

WECO®

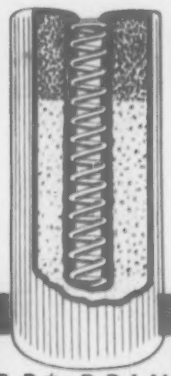

CHARACTERISTIC
PRESSURE LOSS CURVES
Pressure curves for Winslow CP* element and surface-type element under identical operating conditions.
PRESSURE LOSS (PSI)
By-pass open
Surface Type
"CP" Type
ELAPSED TIME
This EXTRA LIFE of Winslow CP* Full-Flow Filters

Saves both the Oil and the Engine

Laboratory tests and operating experience indicate that Winslow CP* filters have as much as 50% more useful life than a surface-type filter. As a result, both the lube oil and the engine are protected beyond normal filter service.

Contractors, for instance, report that useful oil life in diesel-powered equipment has been extended from 80 hours to 300 hours, with Winslow CP* filters.

Most important, engines are protected all the time with Winslow full-flow filtration . . . protected during cold starts, while idling and against excessive dirt . . . protected if a bearing fails. Because of this better oil filtration, engines last longer and require less maintenance. A modest investment in Winslow filters returns substantial dividends.

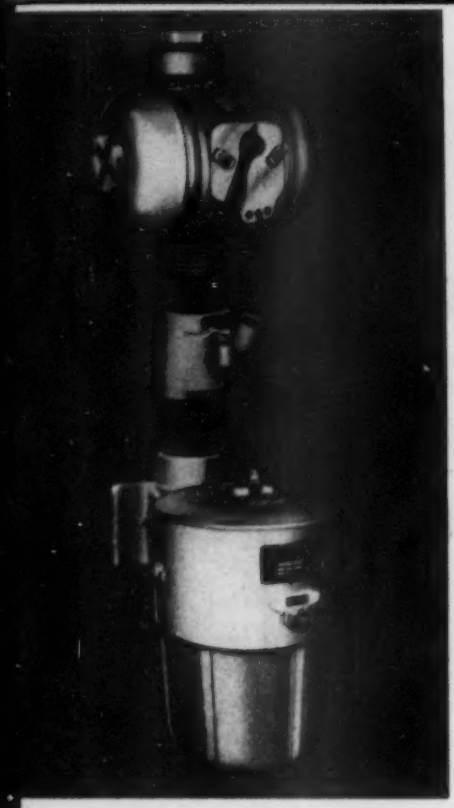


THE CP* PRINCIPLE

Winslow patented CP* (Controlled Pressure) elements are designed to continuously self-adjust the pressure within the filter and allow for a full stream of filtered oil from the filter without opening by-pass valves. This is accomplished through the dual flow capacity, with two types of material, as illustrated.

WINSLOW FILTERS **CP is fully protected by patents and trademarks*

W-56-1 **Winslow Engineering Company** 4069 Hollis Street • Oakland 8, California

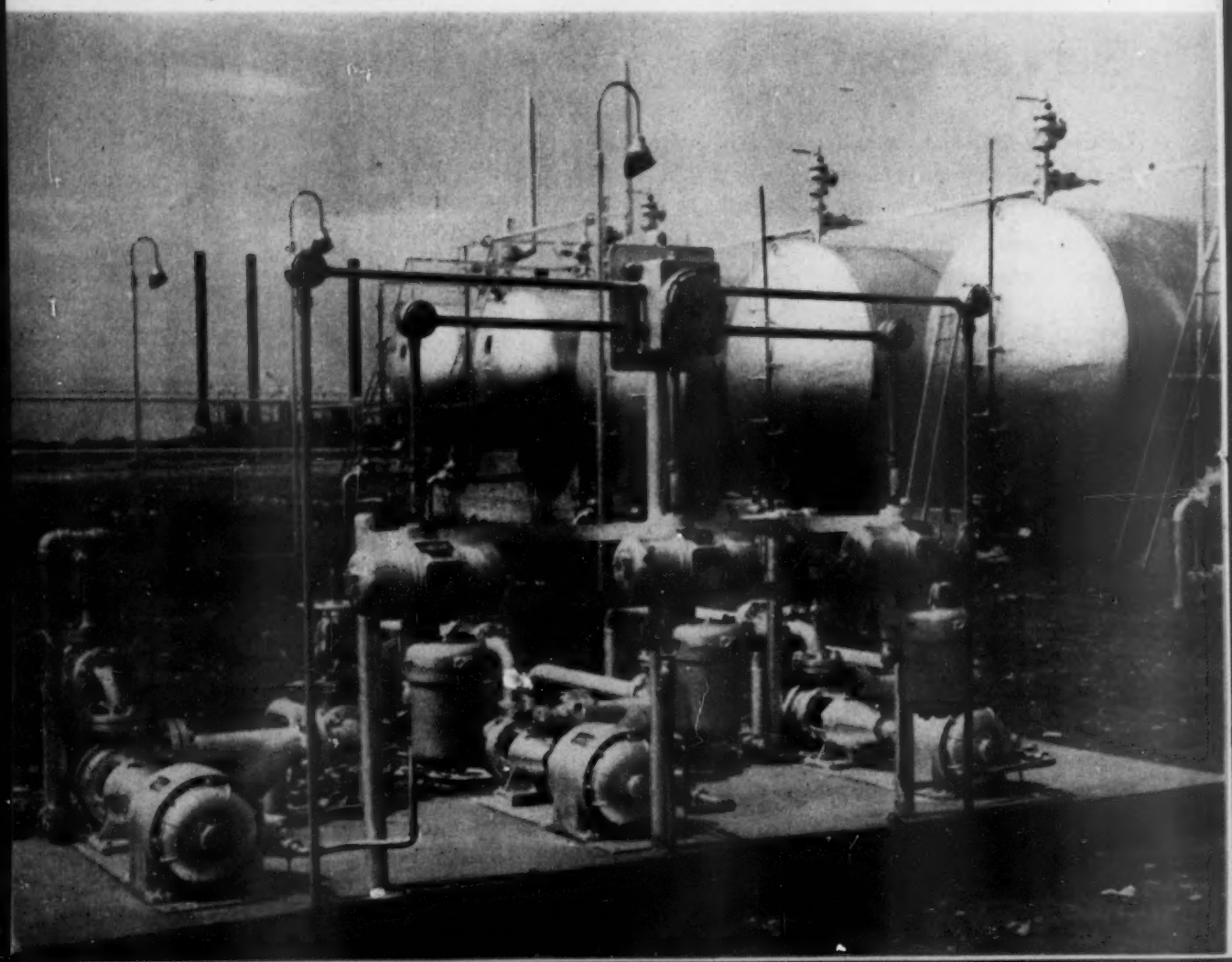


For complete protection

More TOP-QUALITY features!

- First to be U.L. Approved for banked circuit breaker grouping.
- Combinations meet U.L. requirements through approval of components.
- First to achieve safe entrance to motor starter of a combination without shutting off other branch circuits.
- Quick interchange on leading makes of circuit breakers and starters . . . units may be added quickly and easily.
- Full 7-thread Explosion-Proof protection . . . no bolts to strip or flanges to nick.
- Unmatched accessibility for easier wiring and servicing on every job.
- Light-weight construction for easy installation without heavy lift equipment . . . compact design saves space.
- Flexible field set-ups assured with single and duplex male and female hub adapters.

Appleton Circuit Breaker & Motor Starter Unilets on tank car loading pump motors in field processing plant. Photos courtesy Oil & Gas Journal.



..against explosion, dust, rain . . . use

APPLETON

INDUSTRY'S MOST ADVANCED LINE

Circuit Breaker, Motor Starter and Combination Motor Starter

UNILETS®

The biggest advancement in Explosion-Proof design in years!

APPLETON's years-ahead engineering and advanced design assure you of complete protection against explosion and weather. The design, construction and performance of APPLETON *Circuit Breaker* and *Motor Starter Unilets* give you maximum safety and unparalleled ease of wiring, installation and maintenance. You'll discover initial and long term savings, plus many exclusive APPLETON features, not found in any other enclosures.

Where absolute safety is required, whether on hazardous-location motor controls or power lead-in installations, in corrosive or flammable atmospheres, indoors or outdoors, large or small, APPLETON *Circuit Breaker* or *Motor Starter Unilets* will more than pay their way in safer operation and ease of maintenance. Regardless of the installation, APPLETON can serve you better! Send for Bulletin BH today for complete information!

Installations like this provide maximum protection against explosion in hazardous areas.

APPLETON ELECTRIC PRODUCTS®

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An APPLETON Engineer will help you plan your installations without obligation!

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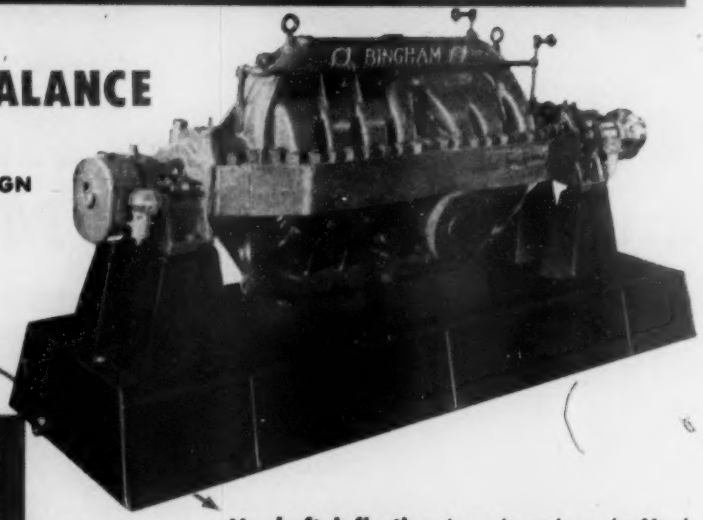
OFFER MOST FAVORABLE OPERATING CONDITIONS FOR MECHANICAL SEALS

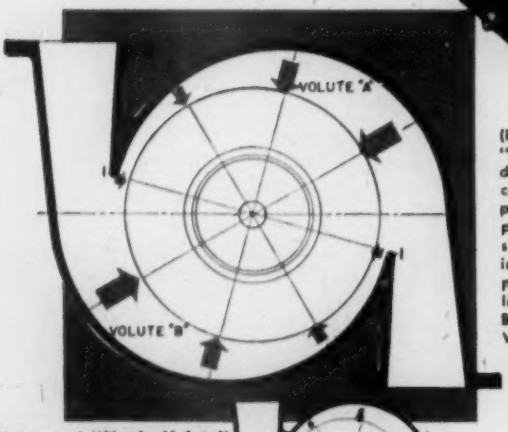
HYDRAULIC RADIAL BALANCE

RESULTING FROM

"DOUBLE VOLUTE" DESIGN

offers these unsurpassed advantages:





(Left) Diagram of a **"Double Volute"** double discharge case of a multistage pump showing equal pressures on opposite sides of the impeller, illustrating principle of Hydraulic Radial Balance in Bingham "Double Volute" Pumps.

Diagram of **"Single Volute"** pump case (right) showing unequal pressure at opposite points around the periphery of the impeller. These unequal pressures cause "SIDE-PUSH" on the rotating elements, causing wear of rotating parts and excessive seal maintenance.

No shaft deflection throughout the entire Head-Capacity-Speed range of the pump. This permits mechanical seals to establish and maintain a uniform "track" between the contacting faces, thereby insuring long life and trouble-free service.

The Pump shaft rotates on its true center at all times, thus establishing the most favorable condition for mechanical seal operation. **Ask any experienced seal manufacturer.**

Consistent records of long mechanical seal life is only one of the reasons why Bingham "Double Volute" Pumps are preferred by major pipe line companies. Bingham "Double Volute" Pumps offer dependability, low maintenance, unsurpassed performance, under all conditions. **Call your nearest Bingham Office for a list of users, including new major lines now under construction which are being equipped with Bingham "Double Volute" Pumps.**

Bingham
SINCE 1921

DOUBLE VOLUTE RADIAL BALANCE

BINGHAM PUMP COMPANY

General Offices: 2800 N.W. Front Avenue, Portland 10, Oregon

Factories: Portland, Ore. • Vancouver, B. C., Canada

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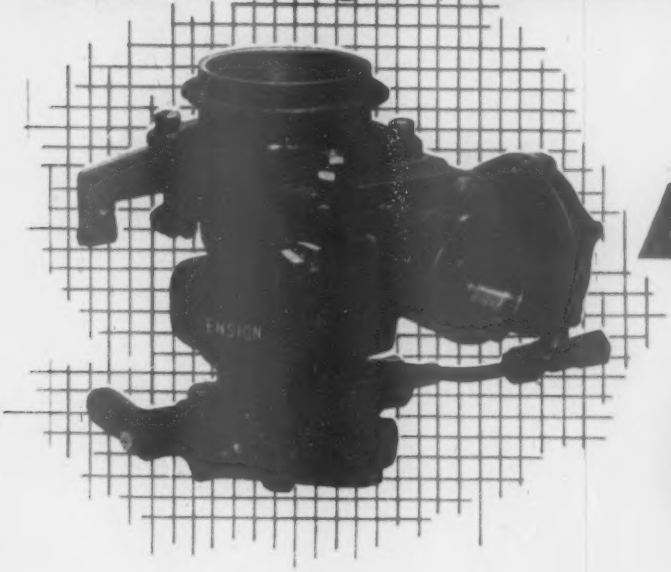
latest in gas carburetor design



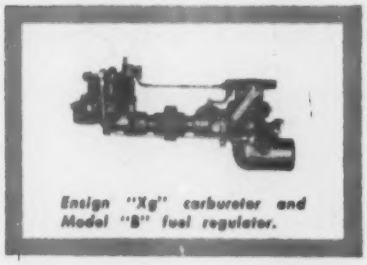
by

ENSIGN

MODEL

Xg

Ensign Model "Xg" in updraft position using 90° air horn.



Ensign "Xg" carburetor and Model "B" fuel regulator.

Ensign Model "Xg" with LP-Gas vaporizer-regulating unit and liquid fuel filter.

The carburetor you see pictured above is the Ensign Model "Xg," latest development in modern gas carburetion.

An engine designer or an oilfield service man will find the "Xg" complete in every detail. Easy to install in either updraft or downdraft positions. Every adjustment is easy to make (all adjustments are shown in view above.) Built-in economizer is a mighty important feature during part throttle engine operation. The famous Ensign easy starting device, the biggest boon to gas engine dependability in many years, plus a wide selection of venturi sizes make the "Xg" the last word in gas carburetion design.

Use the Model "Xg" with Ensign Model "B" gas pressure regulator or with Ensign LP-Gas vaporizer-regulating units and you'll enjoy the finest gas engine performance possible in this day and age.

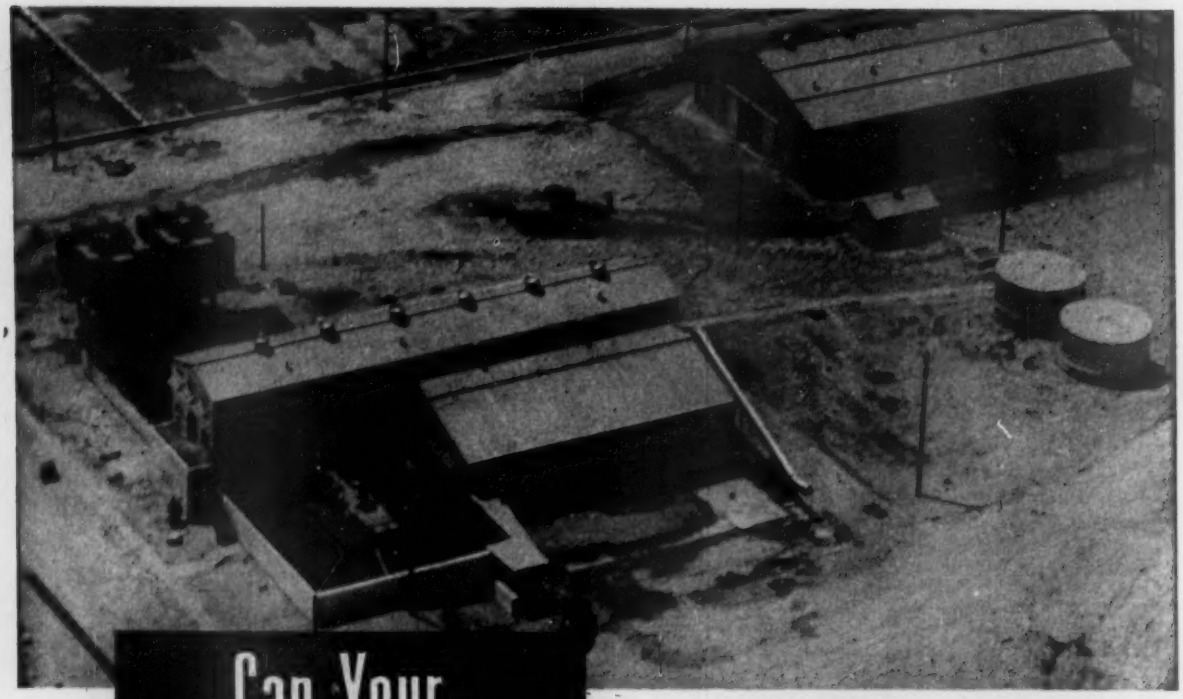
And as progress in the gas engine business unfolds itself you'll find Ensign there first with the most modern equipment—equipment already proved and field tested. Our engineers are years ahead of day to day demands; anticipating future needs, experimenting, improving and testing. For over 42 years we have specialized in carburetion to the exclusion of all else.

Send for Ensign Model "Xg" Bulletin #7078

ENSIGN CARBURETOR COMPANY

7010 S. ALAMEDA ST., BOX 229, HUNTINGTON PARK, CALIF.
Branch Factory, 2330 W. 58th St., Chicago 36, Illinois

Dealers and Distributors in all Principal Oil Fields.



Typical INFILCO flooding water treatment plant includes: Forced Draft Aerators; "ACCELATOR" Treating Plants; Chemical Feeders and INFILCO Gravity Filter Plant.

Can Your Flooding Water Meet this Test?

1. Chemical stability
2. Oil content zero
3. Iron Content 0.2 parts per million
4. Turbidity 1 part per million

If not—you may be jeopardizing the success of your flood!

Most operators agree that these standards for the flooding medium (water, produced brine, or both) are necessary for minimizing clogging of the input formation. Closed systems, or other types of partial treatment, seldom meet these exacting requirements. INFILCO *complete* treating plants, which include the highly efficient ACCELATOR® Stabilizer, provide water within the specified limits. Existing INFILCO installations are treating over 500,000 barrels per day with three-way economy: lower first cost, lowest maintenance and low, low chemical costs. INFILCO engineers have over 30 years experience in designing *complete* flooding water treatment plants. Be sure you are getting maximum oil recovery by consulting your nearby INFILCO engineer. If you prefer, write for complete information.

INFILCO INC.

915 S. Campbell Ave., Tucson, Arizona

Offices in Principal Cities in North America

INFILCO

The one company offering engineered equipment for all types of water and waste processing—coagulation, precipitation, sedimentation, flotation, filtration, ion exchange and biological treatment.

55 MILES SOUTHWEST OF NOWHERE!

Miles of waste land often separate wells from the nearest source of supply . . . miles that present almost insurmountable transportation problems . . . even greater maintenance problems. In these cases, Southwestern Plastic Pipe has proved itself time and again.

Southwestern Plastic Pipe is light weight, easy-to-transport, easy-to-handle, easy-to-install. Fewer men and less time are required for installation. With rust, rot and electrolytic corrosion eliminated, maintenance problems are reduced to a minimum.

Wherever your wells are located, investigate Southwestern Plastic Oil Field Pipe. You'll find real economy now, but even more important, you'll save maintenance expense for years to come.

Write today for full information on Southwestern Plastic Pipe. You'll receive descriptive literature on several types of Oil Field Pipe manufactured by Southwestern . . . each type designed to do specific jobs better. Mail the convenient coupon now.

Look For This Sign At Your Oil Field Supply Store

SOUTHWESTERN PLASTIC PIPE

I am interested in Southwestern Plastic Oil Field Pipe. Please send full information on the following uses. No obligation of course.

☐ Salt Water Disposal ☐ Gathering Lines
☐ Sour Crude Lines ☐ Water Systems
☐ Other (Please Specify)_____

Name_____

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Mailing Address_____

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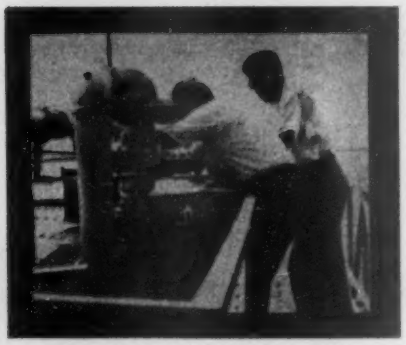
NON CORROSIVE ● ECONOMICAL INSTALLATION ● REDUCES BUILD-UP ● LESS FRICTION LOSS

Southwestern Plastic Pipe Co. A Div. of Texas Vitrified Pipe Co. P. O. Box 117 Mineral Wells, Texas Phone 2050

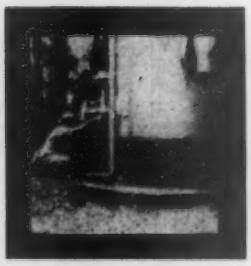


SERVICE

wherever oil is produced or refined

The Tretolite service organization provides competent, experienced advisory service wherever it can benefit the oil industry. In addition to the United States, service engineers are located in Canada, Mexico, Latin America and Europe.

Tretolite teams the best service possible with the best products possible. This policy is your assurance of money-saving results.



T-961

Chemicals and Services for the Petroleum Industry

TRETOLITE COMPANY

A DIVISION OF PETROLITE CORPORATION

SAINT LOUIS • LOS ANGELES

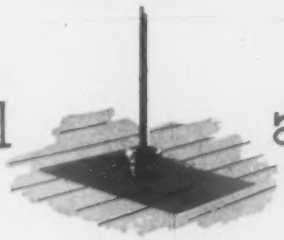
NEW YORK • LONDON

Demulsifying • Desalting • Water De-Oiling • Corrosion Inhibiting
Paraffin Removal • Scale Prevention • Production Stimulation

Everything?..

Yes. Everything!

...to drill



and produce

oil and gas wells

is available at

Continental

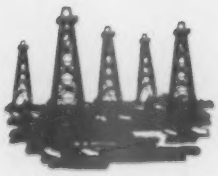
..the Continental

Supply Company

is serving the

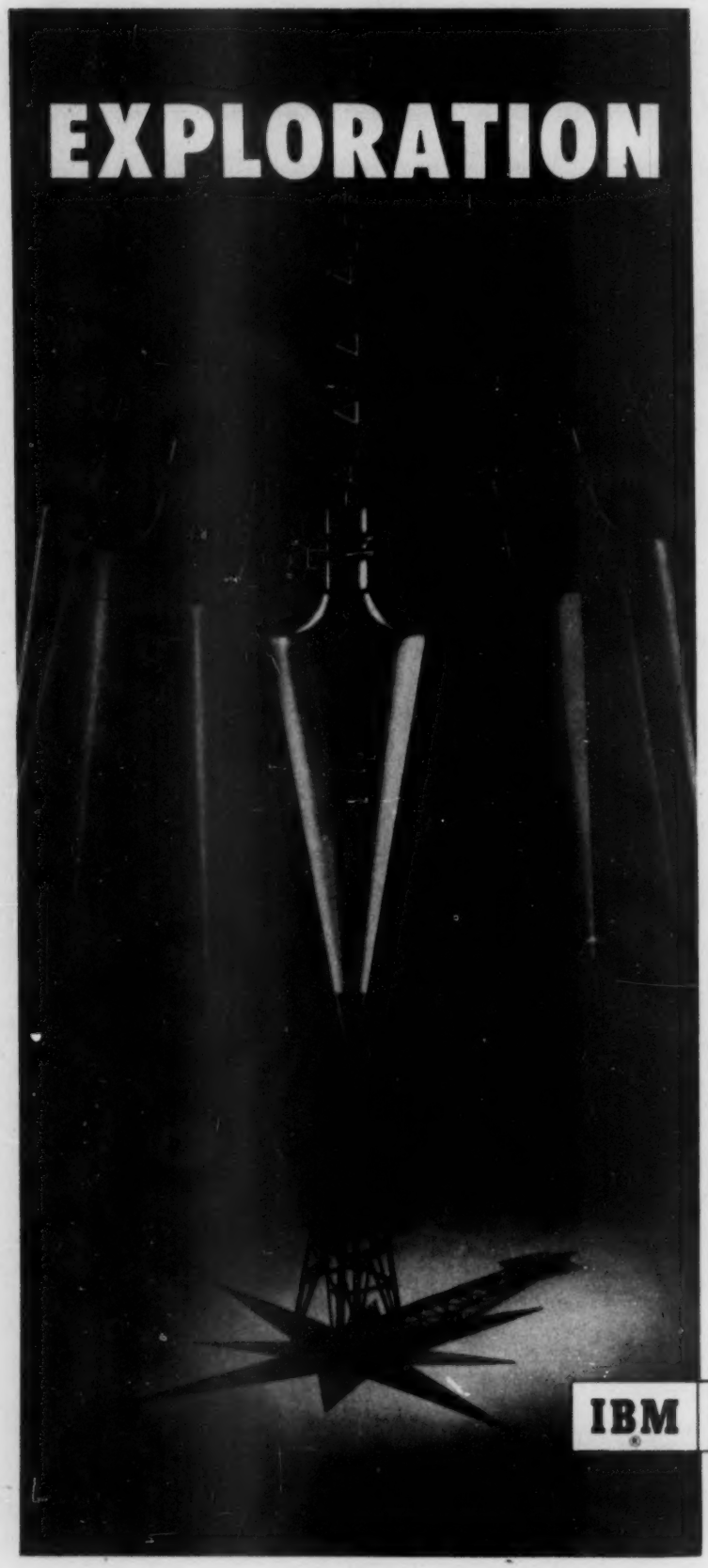
Oil and Gas Industries with

representatives in all principal



oil fields of the world

EXPLORATION . . . and IBM electronics



With IBM electronic data processing you can take much of the guesswork out of oil exploration. With *all* the *facts* to guide drilling operations, the probability of drilling more producers is greater than was ever before possible.

In exploration, for example, seismograph, gravimetric and related data can be held in this electronic file for immediate processing or rework. Quickly, and with great accuracy, complicated problems in Ray Tracing, Residual Gravity and Second Derivation Calculations, Resistivity Computations, Optimum Shot Spacing, Correlation Studies . . . and other equally time-consuming formulas are solved. Results are printed in report form . . . or maintained on tapes or punched cards.

For field crews alone this represents tremendous man-hour savings. Data collected by seismograph crews can be relayed to the central computing unit, processed in relation to all previously gathered data, and new orders relayed quickly to the field to guide further explorations.

IBM electronic data processing systems, with their tremendous magnetic memories and the speed at which they absorb, file, compute, and print answers, are a thoroughly proven way to get essential data *fast!* In today's scramble for oil resources, this means higher profits, less wasted effort, and a gain of useful information heretofore highly desirable but too costly and time consuming to gather.

For the plain facts on IBM electronics in the Oil Industry, call your local IBM representative today, or write: PETROLEUM DEPARTMENT A56, International Business Machines Corp., 590 Madison Ave., New York 22, N. Y.

IBM DATA PROCESSING

EXPLORATION
PRODUCTION
REFINING
TRANSPORTATION

FOSTER WHEELER ANNOUNCES A

COMPLETELY NEW

COOLING TOWER

...designed for FASTER ERECTION
and LONG-RANGE ECONOMY

Here are some of its outstanding new features:

Water-Mizer Drift Eliminators, assembled in racks, engineered for maximum efficiency. Drift losses held well *below* recommended minimum values.

Full Cone Spray Nozzles provide maximum dispersion with exceptionally low pressure drop. Spray pattern remains excellent for any overload and for at least 30% below design flow.

3'x6' Double Diamond Fill Racks utilize heavy stringers and 1" lath spaced in a diamond pattern, affording rigidity while minimizing pressure drop.

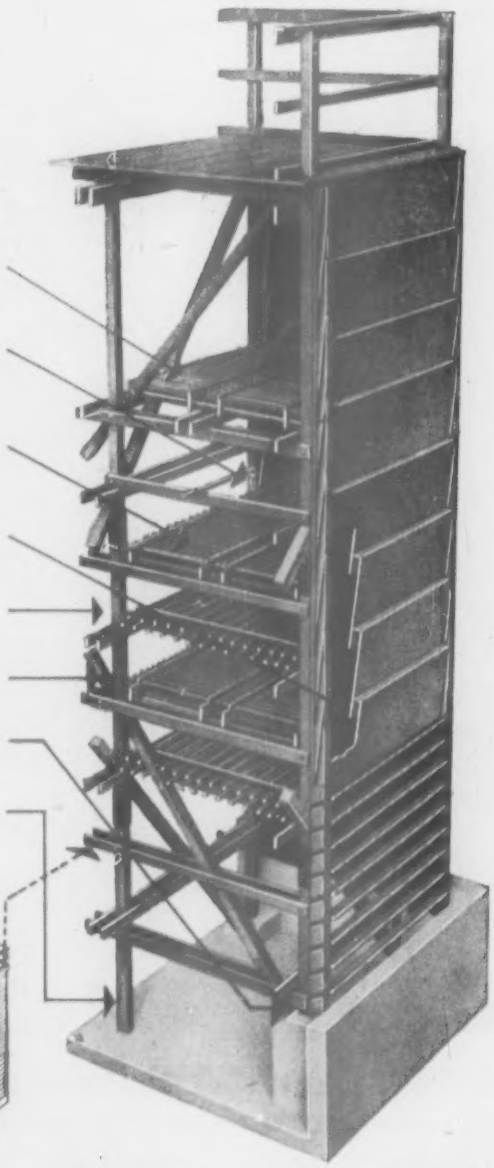
Double Lapped Sheathing Panels provide the water-tight advantage of double-wall construction yet avoid stagnant air spaces and prevent wood attack. Panels are pre-assembled to cut erection time.

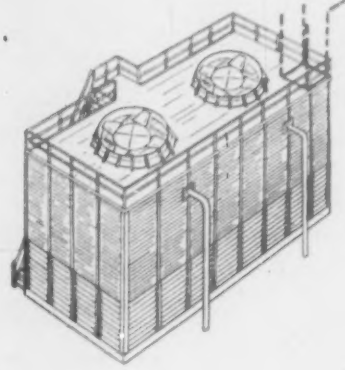
Redwood Framing, structurally redesigned to 6'x6' bays, to provide maximum rigidity and conservative loading of all members.

Simple, Straight-Line Bracing eliminates all eccentric joints and relieves structural members of horizontal shearing and bending stresses.

Simple Clevis Anchors are used on the diagonals, not the posts. Require only one foundation bolt per anchor.

Self-Leveling Interior Posts cut to fit basin floor — compensate for irregularities in level and eliminate need for pads or grouting.





Detail drawing of a single corner bay of the new Foster Wheeler Induced Draft Cooling Tower. Lower fill racks have been omitted to show structural details to better advantage.

THESE are just a few of the many advantages designed into the new Foster Wheeler Cooling Towers. Built of decay-resistant California redwood throughout, this induced-draft counter-flow tower represents an important advance in cooling tower design. Ask your FW representative to give you complete details — or send for additional information. *Foster Wheeler Corporation, 165 Broadway, N. Y. 6, N. Y.*

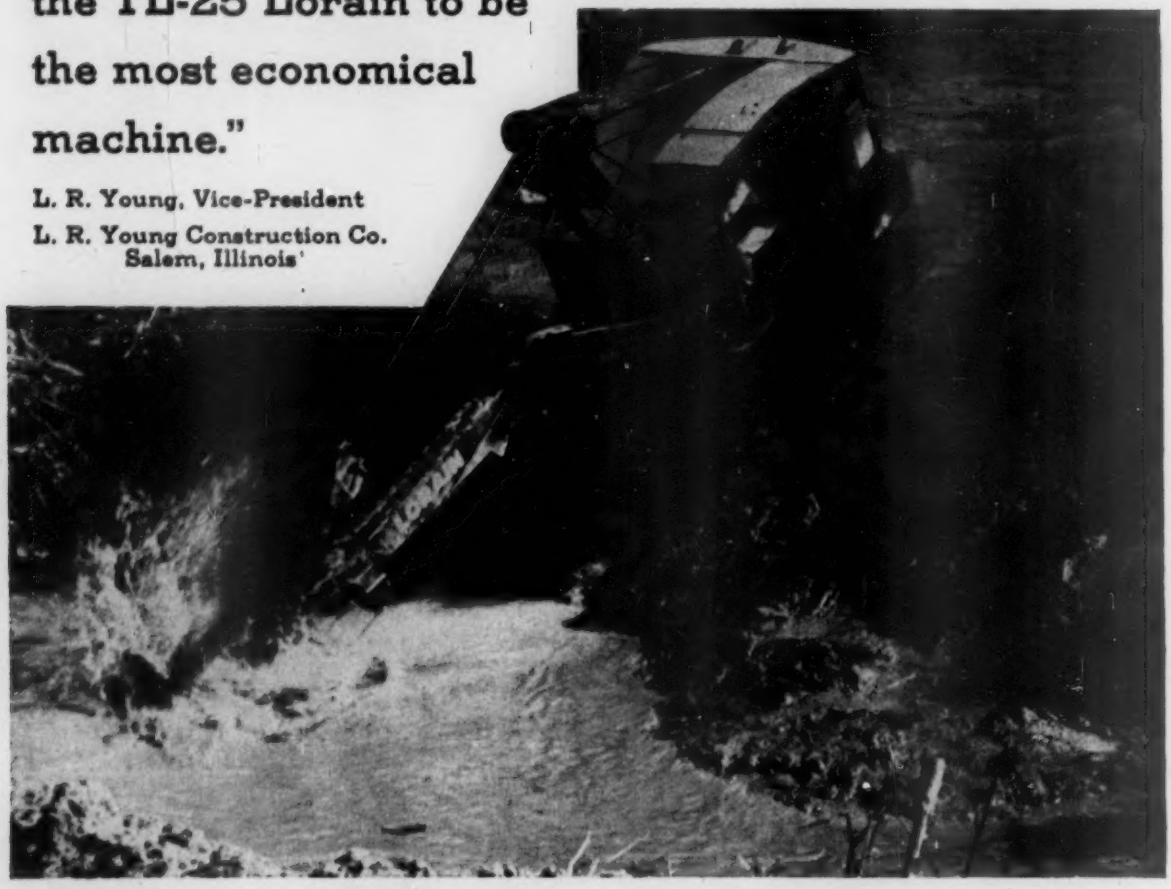
FOSTER WHEELER

NEW YORK • LONDON • PARIS • ST. CATHARINES, ONT.

"After 10 years of pipeline construction experience over all types of terrain, we find the TL-25 Lorain to be the most economical machine."

L. R. Young, Vice-President
L. R. Young Construction Co.
Salem, Illinois

These are the words of an experienced pipeline man. Lorain Hoes have gone with his spreads over many miles of the toughest terrain. Typical is the job below where a ¾-yd. Lorain-25 Hoe works on the bank of the Saline River in Illinois. This is part of a 16 mile long, 6" crude oil line, for the Sohio Pipeline Co., running from the Eldorado Pool to Enfield, Illinois. Below are some special reasons that pipeliners like Lorain performance—there are many more.



LORAIN features for pipelining needs

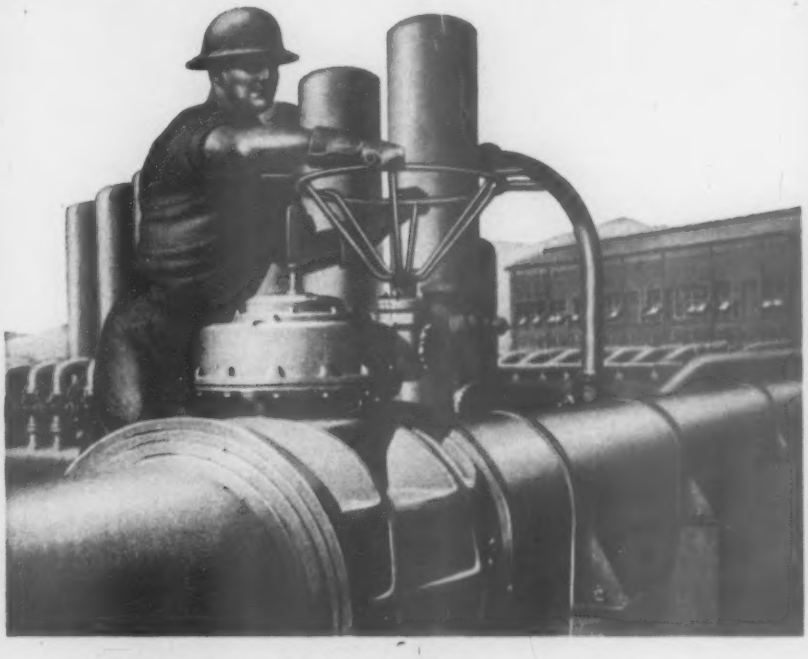
Here's more operating ease and quicker response in today's ¾-yd. Lorains. From the operator's cab—with turntable in any swing position—the operator simply flicks a lever and hydraulic power goes to work on all crawler controls.

- INDEPENDENT HOUSE LOCK is engaged promptly and positively and released instantly by hydraulic power through a handy, easy-acting control, to prevent turntable rotation.
- SWING AND TRAVEL JAW CLUTCHES are selected and engaged by simply flipping a control.
- TREAD LOCKING PAWLS are fully enclosed . . . protected from dirt and mud and are instantly engaged and released by fast-acting hydraulic power.
- CRAWLER STEERING is hydraulically power controlled by a single short lever—no operator fatigue. Steer either right or left while traveling forward or backward, with turntable in any position of swing.
- SEALED IDLER ROLLERS on anti-friction bearings keep out mud, water and abrasive materials.
- DROP-FORGED TREADS with REPLACEABLE TREAD PIN BUSHINGS reduce maintenance.
- GOOSENECK HOE BOOM up to 19 ft. long. All welded.

Check the many additional Lorain features with your Thew-Lorain Distributor before you plan your next job.

THE THEW SHOVEL CO., LORAIN, OHIO

THEW LORAIN



TURN UP THE HEAT...
more gas is on the way

1.7 BILLION cubic feet of natural gas!

That's what Tennessee Gas pipes daily to Eastern homes and industries. And still they call for more.
To meet that steadily increasing demand, we recently completed a thousand mile loop linking the New York City area to our expanding 9000 mile system.

Huge underground storage fields close to consuming markets further assure dependable supply during peak winter demand.
In the gas-producing Southwest a reserve of 12 trillion cubic feet!
And new reserves added each year.

More heat, America? Turn it up. Tennessee Gas can deliver.

Industry joins the homeowner in the swing to natural gas. More and more processes that require precise, easily controlled heat find the answer in this superior fuel

TENNESSEE GAS
TRANSMISSION COMPANY
AMERICA'S LEADING TRANSPORTER OF NATURAL GAS

HOUSTON, TEXAS

One of a series of advertisements appearing in full color in national publications.

More Light on Heat — TGT advertisements like this spotlight the achievements of the natural gas industry.

Tell how that industry harnessed a great natural resource, once wasted, and put it to work.

Show what the industry has done ... and is doing ... to make this superior fuel and its better living available to more millions.

It's a continuing and dramatic story that benefits producer, transporter and distributor alike.

TENNESSEE GAS TRANSMISSION COMPANY
HOUSTON, TEXAS

Now the finest of needle valves is available

416 Stainless throughout...

In the Marsh Needle Valve, operating men found a valve that was better all the way through. Then came the call for a valve of like quality and precision for corrosion service . . . to be 416 stainless steel throughout.

The valve illustrated here is the answer. Like the parent valve, this new valve has safety and strength to spare . . . guaranteed for working pressures up to 10,000 psi . . . equally efficient and effective in any lower pressure range.

It too is machined from solid bar stock—in this case, 416 stainless steel. Its precision-ground and-machined stem is hardened 416 stainless. Packing is the special "Marpak" ring . . . one-piece, non-binding, long-lasting. So finely built is this needle throttling and cut-off valve that it can be easily throttled down to exceptionally fine regulation even on extreme pressure.

Read the list of features opposite. Then write for new bulletin No. NV-2 containing complete details.

416 Stainless Steel
...all the way through!

- Body and stem guide machined from bar stock.
- Valve stem, hardened stainless.
- Packing, special Marsh "Marpak" moulded ring.
- Fine stem threads for strength and precision throttling.
- Deep inlet and outlet thread chambers.
- Bodies marked in accordance with MSS regulations.

Maximum Working Pressure 10,000 P.S.I.

Water, oil, gas or corrosive fluids not injurious to 416 stainless steel.

The new all stainless valves (Series 1924) includes globe and angle patterns with double female connections in sizes ⅛", ¼", ⅜", ½", ¾", 1"; also globe and angle valves with male inlet and female outlet in sizes ¼" and ½".

MARSH INSTRUMENT CO. Dept. L, Skokie, Ill.
Sales affiliate of Jas. P. Marsh Corp.

Marsh Instrument & Valve Co. (Canada) Ltd.
8407 103rd Street, Edmonton, Alberta, Canada

HOUSTON BRANCH PLANT: 1121 Rothwell Street, Sect. 15, Houston, Texas

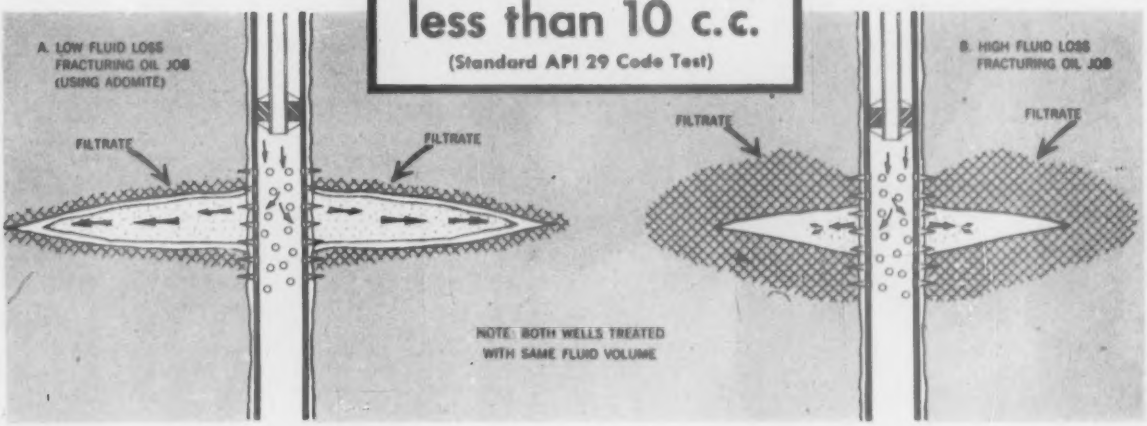
MARSH

"THE STANDARD OF ACCURACY"

For more productive fracturing... least fluid loss

specify Adomite*

Cuts fluid loss to less than 10 c.c.
(Standard API 29 Code Test)


A. LOW FLUID LOSS FRACTURING OIL JOB (USING ADOMITE)
FILTRATE
FILTRATE
NOTE: BOTH WELLS TREATED WITH SAME FLUID VOLUME
B. HIGH FLUID LOSS FRACTURING OIL JOB
FILTRATE
FILTRATE

Adomite is the remarkable fluid-loss control additive that is building production and profits virtually everywhere it is used. Very small amounts of Adomite reduce the API fluid loss of lease crudes to 10 c. c. at most reservoir conditions. With gelled crudes, even smaller quantities are required. *Easy to use*, Adomite is a dry material in flake form that is mixed directly into the crude or gelled crudes on the lease. Only standard mixing equipment is required.

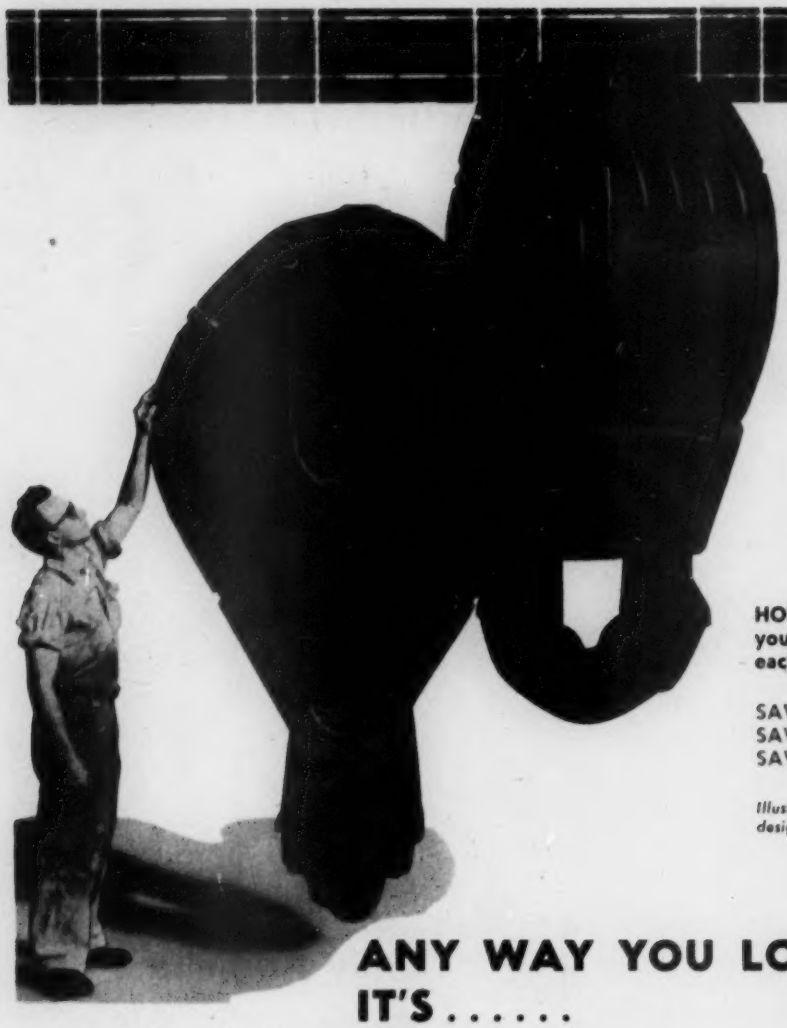
*Trade-mark, Continental Oil Company

Only Adomite can do so many things so effectively . . .

- Seals the fracture face—minimizes fluid loss.
- Longer fractures—deeper penetration of sands.
- Greater sustained production with a given fluid volume at lower cost.
- Saves you money—utilizes lease crudes—less pumping.
- Cleans up quickly—does not contaminate produced oil or the formation.
- Fewer "Sandouts."
- Profitably used for "drilling in" and "work overs."

© 1956, Continental Oil Company

Be sure to specify Adomite on your next fracture job



"Any Way You Look At It, It's TOPS —"

HOW LONG . . . do you wait for your Block to FALL after racking each stand of pipe?

SAVE: **seconds per fall.**
SAVE: **minutes per trip.**
SAVE: **hours per well.**

Illustrated left: McKissick Traveling Blocks designed and built for SPEED!

ANY WAY YOU LOOK AT IT IT'S . . . . . .

Streamlined, smooth flowing lines eliminate all projections. No hanging on derrick girts.

Heavy center plates divide each sheave and distribute load over entire block, eliminates center pin deflection.

Extra heavy weighting at lower end of block gives better balance for straight non-wobbling falls.

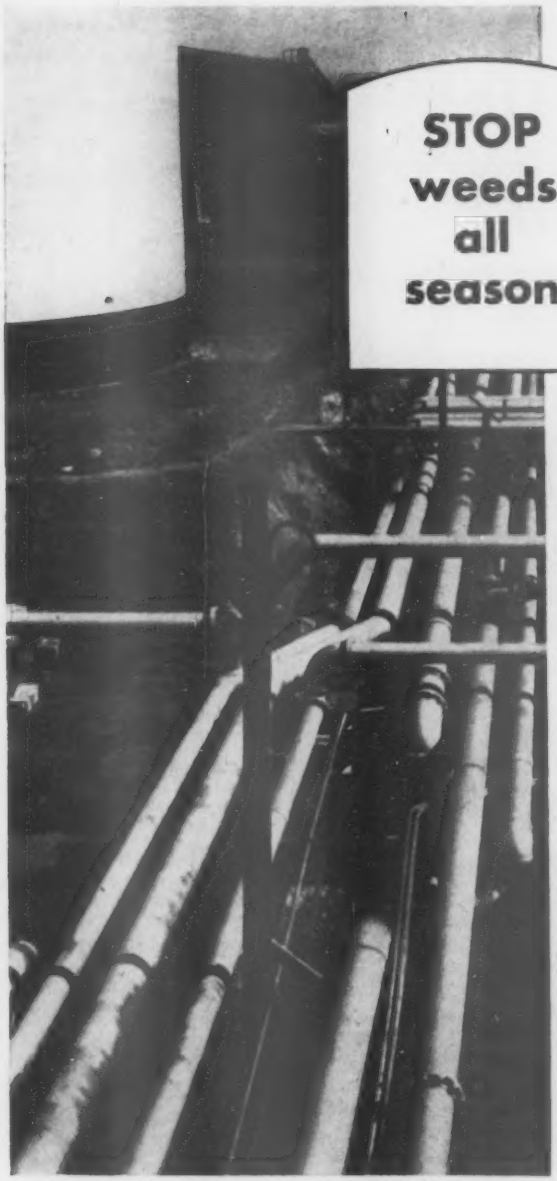
Patented E-Z opening guards—Easy exposure of sheave cluster for quick reeving.

5 SHEAVE, 450 TONS — 14,000 LBS.
6 SHEAVE, 500 TONS — 16,000 LBS.

McKISSICK PRODUCTS CORPORATION
Box 2496 Tulsa, Oklahoma

McKISSICK BUILDS A BETTER BLOCK FOR EVERY PURPOSE

McKISSICK



Still weed-free one year after treatment with "Telvar." The area around the tanks and pipeline was sprayed with a single treatment of "Telvar" a year before this photo was taken. Weed-control costs are cut with "Telvar" because it gives thorough, long-term weed control.

FREE ILLUSTRATED BOOKLETS describe how to control weeds and brush with Du Pont chemicals. Write to Du Pont, Grasselli Chemicals Dept., Rm. D-4032, Wilmington, Del. In Canada, Du Pont Company of Canada Limited, 80 Richmond Street West, Toronto, Canada.

Spray just once with Du Pont TELVAR®

WEED KILLERS

When you use "Telvar" weed killers, vegetation is killed through the roots and regrowth is prevented because the chemical remains in the soil . . . provides residual action all season long. And low dosages (1 to 1½ lbs. per 1,000 sq. ft.) make it cost little for the results you obtain. Such low rates also mean less handling, less use of storage facilities.

"Telvar" weed killers come as wettable powders, are non-corrosive, non-flammable, non-volatile, low in toxicity to humans and livestock.

Include "Telvar" weed killers in your weed-control program this year. Prove to yourself how these products of Du Pont research can help cut your maintenance cost to new low levels.

• • •

Where brush is a problem, Du Pont Ammate® X weed and brush killer is the product you need. It kills more kinds of brush with unusual safety. With ordinary precautions, "Ammate" X may be used close to such crops as cotton, tomatoes, soybeans and peanuts.

On all chemicals, follow label instructions and warnings carefully.

DU PONT
REG. U. S. PAT. OFF.

WEED and BRUSH KILLERS

BETTER THINGS FOR BETTER LIVING...*THROUGH CHEMISTRY*

GET POSITIVE TUBING RELEASE

UNDER ANY WELL CONDITIONS
with GUIBERSON

TUBING SAFETY JOINTS!

TYPE "F"
A new safety joint for deep well work. Collar size O. D. Multi-layer friction ring prevents galling and seizure. Leaves box connection up when released.

TYPE "A"
A top quality, husky joint for deep wells. Available in two shear point strengths —2 pins for 16,000 pound shear or 3 pins for 22,000 pound shear. Leaves box connection up when released.

TYPE "B"
A safety joint, precision-built but low cost, for use in shallow wells. Collar size O. D. Multi-layer friction ring prevents galling and seizure. Leaves pin connection up when released.

GUIBERSON SAFETY JOINTS

are painted in different colors for identification and release direction.

	RED	BLUE	GREEN
Type A	22,000# RH	16,000# RH	LH
Type B	RH	—	LH
Type F	RH	—	LH

IN shallow, medium or deep wells, Guiberson tubing safety joints are your best insurance against stuck tools, bad sanding and other well hazards. Guiberson's complete line of tubing safety joints give your operator a reliable, positive point of release. Three types of Guiberson safety joints... each with right or left hand release... each with positive "O" ring seal ...in three price ranges—can keep you *safe* instead of sorry!

GUIBERSON

Better Be Safe Than Sorry!

EQUIPMENT MEN . . . in the News

A-C Makes Kingsbury Sales Manager, Norwood Pumps

Appointment of Herbert K. Kingsbury as manager of product sales, centrifugal-pump section, Allis-Chalmers Norwood Works, has been announced by M. L. Murdock, manager of the section.

Kingsbury joined Allis-Chalmers in 1943. He had been an application engineer in the firm's West Allis Works before transferring to Norwood Works in 1952.

Baash-Ross Relocates West Coast Personnel

Leo Cypher, West Coast area sales manager for Baash-Ross Tool Co., division of Joy Manufacturing Co., has announced the following relocation of the sales personnel in the West Coast area.

Bill Grier, formerly in Los Angeles city sales, has been assigned to Long Beach district sales with headquarters in Long Beach. Ed Carne, formerly in Long Beach district sales, has been assigned to San Joaquin Valley sales with headquarters in Bakersfield.

Harold Adams, formerly in San Joaquin Valley sales, has been assigned to coastal district sales with headquarters in Ventura. Bob Drueke, formerly in coastal district sales, has been assigned to Los Angeles city sales.

Alexander Completes Marshland Barge for New Firm

A new company entered the field of oil-drilling operations in December when Alexander Shipyard, Inc., completed this marshland barge for Shoreline Drilling Co. of New Orleans. Shoreline is a subsidiary of J. C. Trahan Co. of Shreveport.

The first barge for the new company went on location at Halter Island for Shell Oil Co. The barge was built and outfitted by Alexander Shipyard due to the urgent need of this type barge by the new company. Before the close of its first month on location, the barge had completed two wells for production for Shell Oil Co.

Barge No. 1 is 165 ft. long, 36 ft. wide, and 10 ft. 9 in. deep with a 77-ft. by 8-ft. slot. It has a drilling capacity of 12,000 ft. and a Lee C. Moore mast of 750,000-lb. capacity. The drawworks and compound of the barge are Unit Rig Model U-40, powered by two General Motors quads having a total of 1,200 hp.

Williams Brothers Forms Engineering Company

John H. Williams, president of Williams Brothers, has announced the formation of Williams Brothers Corp., organized to handle the engineering work of various Williams enterprises.

New officials of Williams Brothers Corp., all of whom are professional engineers, will have been promoted from the engineering department of Williams Brothers pipeline organization. They are: John Williams, president; C. M. Collins, executive vice president; Vincent Butler, vice president; and Wilson N. Gilliat, chief engineer.

Collins was formerly chief engineer of Williams Brothers Co. Butler served as chief engineer for Texas Co. in Venezuela from 1947 until 1952, when he joined the Williams company. Gilliat joined the Williams organization in 1954. He was formerly with Burns & McDonnell, C. F. Braun, and was with Great Lakes Pipeline Co., in Kansas City, Mo.

New officers of Williams Brothers Corp. are: Wilson N. Gilliat, Vincent E. Butler, and C. M. Collins. All but Williams, who will head the new organization, were formerly in the engineering department of Williams Brothers Co.

R. M. Cook Purchases Formation Testing Company

R. M. Cook has purchased the patents and physical assets of Acme Tool & Testing Co. of Long Beach, Calif., and is now operating an oil-well testing service under the name of Cook Testing Co.

The Cook formation tester is noted for its simplicity, ruggedness, ease of operation and firing mechanism. It was invented and placed on the market by Boyd McKinley of Acme Tool & Testing, who will continue his connection by remaining with Cook Testing Co.

Cook has had years of sales and executive experience with Pacific Cementing, Byron Jackson, International Cementers, McCullough Tool Co., Security Engineering Co., and Great Lakes Carbon. Hi Whitney, formerly of Security Engineering Co., and John Dick-

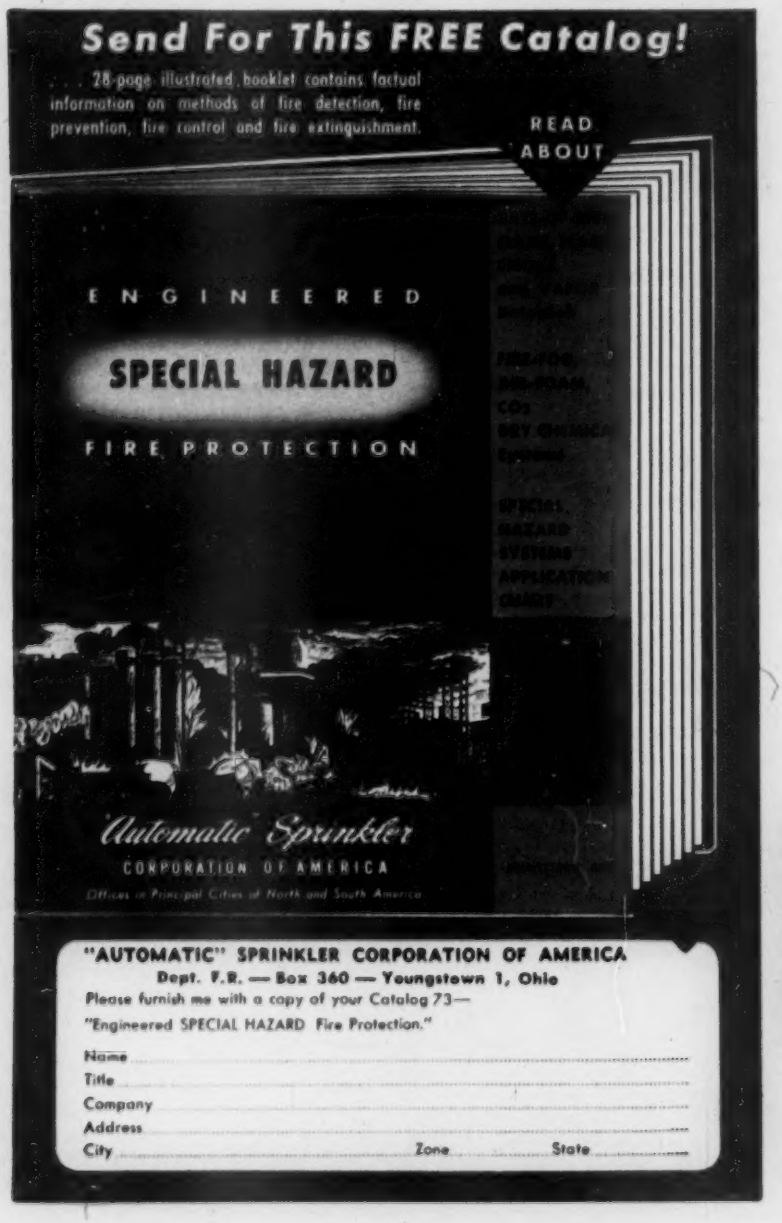
mann, formerly chief engineer of Baash-Ross, are associated with Cook Testing. Service facilities will be expanded in the near future to include the Permian basin, Gulf Coast, and Canada.

Morris Named Ass't. District Manager for Tube Turns

L. J. (Lew) Morris has been appointed assistant district manager at Pittsburgh, succeeding W. C. (Bill) Robinson, it is announced by John G. Seiler, executive vice president of Tube Turns, Louisville, Ky. Robinson was recently made an assistant sales manager and is engaged in sales promotional programs in the company's eastern division.

Morris was process-equipment buyer from Fraser-Brace Engineering Co., Meadsville, Pa., before joining one of Tube Turns' affiliated companies in 1943. He became a member of the Pittsburgh sales staff in 1949.

T. T. (Jock) Thompson has been added to Tube Turns' sales staff at Pittsburgh, concurrent with the appointment of Morris. He was Pittsburgh representative of the Watson-Stillman Fittings Division of H. K. Porter Co. before becoming associated with Tube Turns.


Send For This FREE Catalog!
28-page illustrated booklet contains factual information on methods of fire detection, fire prevention, fire control and fire extinguishment.
READ ABOUT
ENGINEERED
SPECIAL HAZARD
FIRE PROTECTION
Automatic Sprinkler
CORPORATION OF AMERICA
Offices in Principal Cities of North and South America
"AUTOMATIC" SPRINKLER CORPORATION OF AMERICA
Dept. F.R. — Box 360 — Youngstown 1, Ohio
Please furnish me with a copy of your Catalog 73—
"Engineered SPECIAL HAZARD Fire Protection."
Name
Title
Company
Address
City Zone State

Atlas Powder Acquires Stock of Aquaness Corp.

F. E. FUCHS

Acquisition of Aquaness Corp. by Atlas Powder Co. has been approved by the directors of the two organizations, it was announced jointly by Ralph K. Gottshall, president of Atlas, and R. L. Wheelock, president of Aquaness. Aquaness will function as a department of Atlas' chemicals division, Gottshall stated. Fritz E. Fuchs, who served as vice president and general manager of Aquaness Corp., will be manager of the new Aquaness department.

Aquaness was formed in 1947 to manufacture petroleum dehydrating compounds. In 1952 the company launched a successful diversification program which took it into the production of corrosion inhibitors, bactericides and other chemicals marketed to the oil industry under such trade names as Aquaness, Cronox, and Calnox.

Atlas' research and development facilities will supplement the production and sales position which Aquaness has established in the petroleum industry and give Atlas a plant location closer to the major point of use of oil-industry products.

Phillips and Gayle Elected To New Posts by Delta Tank

Hal S. Phillips, president of Delta since 1946, has been elected chairman of the board of Delta Tank Manufacturing Co., a wholly owned subsidiary of General Gas Corp. He announced the election of Kenneth H. Gayle, Jr., former president of Ingalls Iron Works Co. of Birmingham, Ala., as president of Delta.

Delta is a leading fabricator of unfired pressure vessels and cylinders for

H. S. PHILLIPS

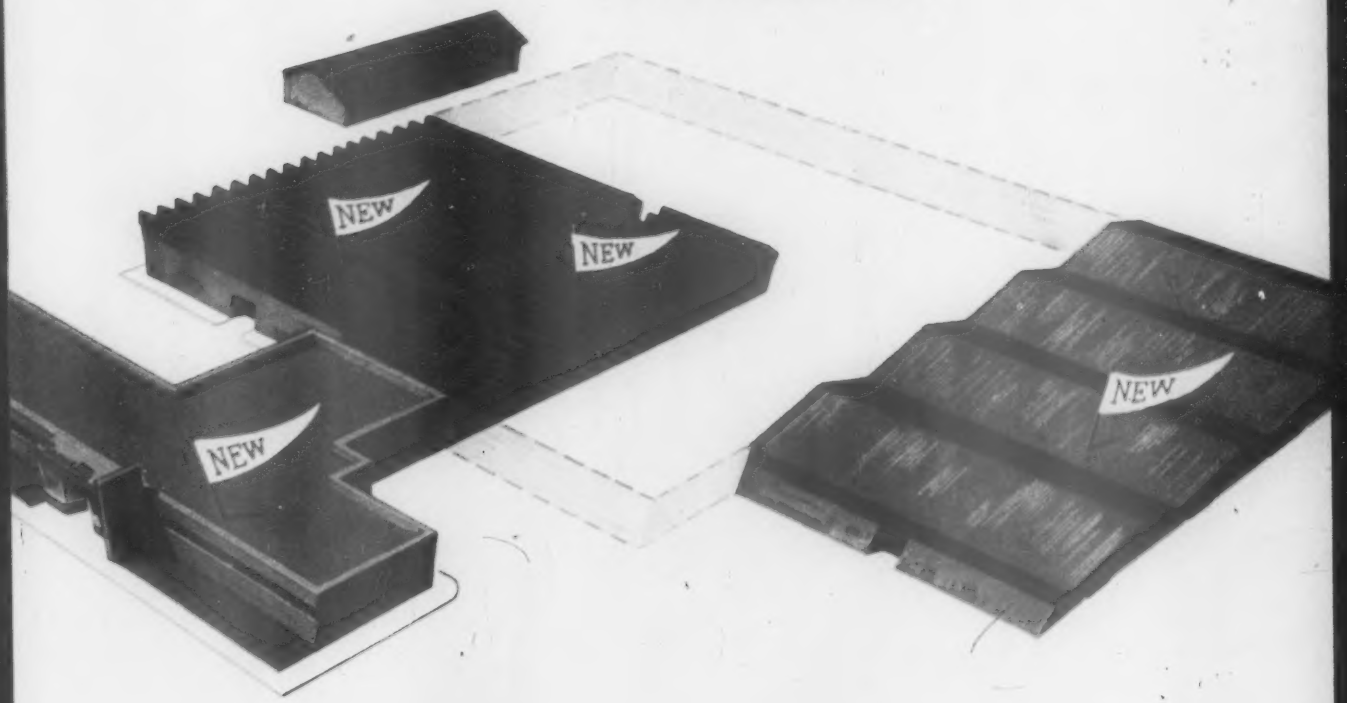
K. H. GAYLE, JR.

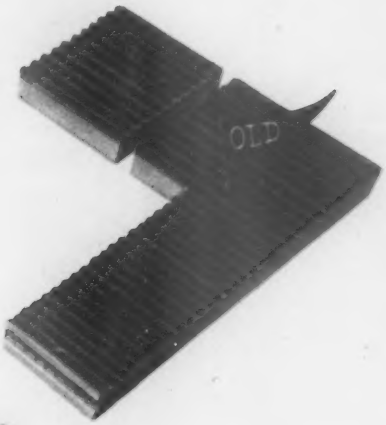
liquefied petroleum gas and anhydrous ammonia and also manufactures pressure vessels and other heavy equipment for the petroleum, chemical, and petrochemical industries.

Gayle served as president of Ingalls

now

Security triples Dallas plant capacity to meet increased Rock Bit Demand...





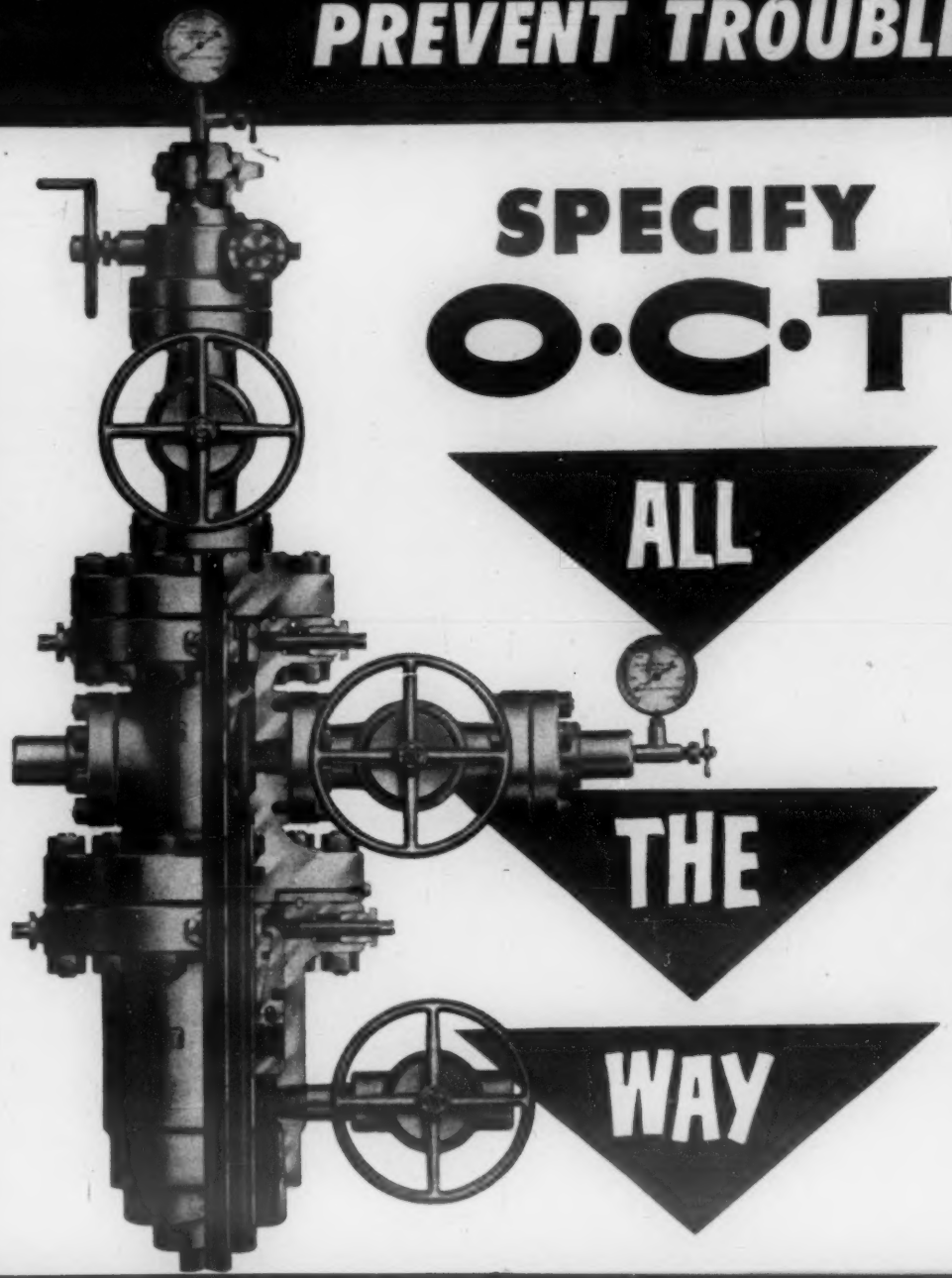
1. Research facilities vastly increased
2. Industry's finest heat-treat equipment
3. Latest automatic machines
4. Produced under most rigid quality control and inspection
5. Pacific Coast production capacity *increased by 20%*

Our 25th Year serving the Petroleum Industry

Security ENGINEERING DIVISION
Plants: DALLAS, TEXAS · WHITTIER, CALIFORNIA
Export Office: Chanin Bldg., New York, N.Y.

ONE OF THE DRESSER INDUSTRIES

PREVENT TROUBLE BEFORE IT STARTS



SPECIFY O·C·T

ALL THE WAY

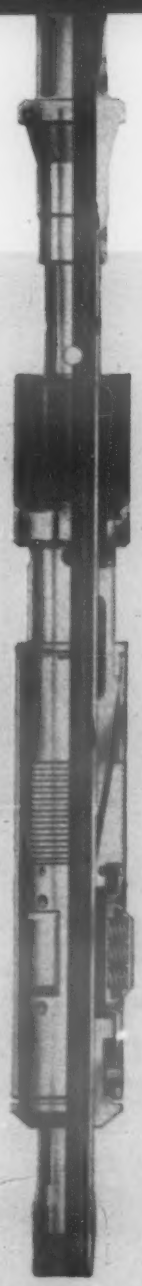
O-C-T FLOW CONTROLS save up to 90 per cent in cost and 70 per cent in weight when used to replace conventional wings. Gate valve and seat may be replaced by one man in five minutes.

O-C-T CHOKES are available in three positive types and three adjustable types for all pressure ratings and production situations.

O-C-T FLANGES AND FITTINGS are made in a complete range of sizes, styles and pressure ratings to meet any Christmas Tree requirement. Only the finest materials and heat treatments are used.

O-C-T TUBING HANGERS are available in styles to meet any completion requirement. Special attachments are available to permit drilling-in, running and landing tubing under pressure.

O-C-T TUBING HEADS are made in four basic types for every pressure and completion requirement—from extreme pressure 30,000 lb. test, down to special low-cost heads for pumping wells.



DOWN

The best way to prevent disastrous equipment failures and unnecessary workovers is to specify high quality equipment of the right design in the first place. O-C-T offers the finest equipment available and has the largest service organization in the field to help set and service well-head assemblies. Whatever your completion problem, O-C-T has a safe answer that will save you money by preventing trouble before it starts.

O-C-T CASING HANGERS are offered in six different types to meet every price limit and completion practice. The C-19 is the fastest and safest casing hanger available today.

O-C-T CASING HEADS are available in four basic types to satisfy any requirement of price, pressure rating and completion program.

O-C-T PRODUCTION PACKERS run in easily, set easily, seal positively under severe conditions and release without difficulty. They are available in two types, either with or without packer hold-down.

O·C·T

P O BOX 3091, HOUSTON TEXAS

Export Representatives: Sterling Areas—Le Grand, Sutcliff & Gell, Ltd., Rochester, Kent, England. South America—East West Oiltools, C. A., Del Lago Hotel, Maracaibo, Venezuela. Address Export Inquiries for All Other Countries to P. O. Box 3091, Houston, Texas.

Iron Works Co. from 1951 through September 1955. He joined Ingalls' engineering and sales department in Birmingham in 1923 after a year with American Bridge Co.

In 1925 Gayle was named Ingalls' New Orleans district manager and 2 years later established Ingalls' New York district office. He was instrumental in opening Ingalls' Verona, Pa., plant in 1930, and in 1931 was assigned to the firm's New York office as district manager. In 1939 he was named sales manager of Ingalls' northern division with headquarters in New York and was elected a vice president of the company in 1945.

Peerless Pump Holds Sales Meeting at Los Angeles

A recent meeting in Los Angeles was attended by all district sales managers and central engineering, manufacturing, and administrative personnel of Peerless Pump Division, Food Machinery & Chemical Corp. The meeting directed by G. F. Twist, FMC vice president and Peerless divisional general manager, and chairmanned by B. A. Tucker, Peerless divisional sales manager, covered a review of 1955 accomplishments.

Personnel who attended the meeting are:

First row: C. H. Sortor, Fresno; C. C. Cook, Atlanta; W. J. Blair, Los Angeles; G. D. Sickert, Indianapolis; B. A. Tucker, Los Angeles; J. F. Van Dam, Los Angeles; R. P. Young, New York; C. L. Nickel, Indianapolis; W. T. Harman, Indianapolis; E. W. Lundy, Los Angeles; S. M. Riordan, Jr., Los Angeles.

Back row: J. B. Downie, Los Angeles; R. G. Trout, Los Angeles; V. L. Ray, Los Angeles; R. F. Foster, Los Angeles; R. E. Kummer, Indianapolis; F. D. Widener, Los Angeles; G. F. Twist, Los Angeles; E. H. Hansen, Fresno; J. C. Bonsall, Los Angeles; W. E. Griffin, Lubbock; F. G. Riddle, Los Angeles; N. C. Olson, Indianapolis; R. H. Hull, Los Angeles; D. R. Rankin, Los Angeles.

. . . It's a JENSEN!

Production records prove conclusively that JENSEN JACKS stay on the job longer and give less trouble. It's a reputation that started more than 35 years ago and is recognized today by producers everywhere.

JENSEN JACKS are reliable because they are designed right and produced to meet rigid specifications. Mass production makes the price right too!

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JENSEN BROS. MFG. CO., INC.
Coffeyville, Kansas, U.S.A.
Export Office:
25 Broad Street, New York City

Rockwell Names Two West Coast Sales Managers

New appointments for two key West Coast sales officials have been announced by H. Boezinger, western re-

W. F. GULLEY

R. E. NIMTZ

gional sales manager of Rockwell Manufacturing Co.'s Meter & Valve Division.

William F. Gulley, Seattle district sales manager since 1951, has been named San Francisco district manager. He is succeded by Roy E. Nimtz, a sales engineer in the San Francisco district for over 3 years.

Gulley joined Rockwell as a sales

from skilled and experienced hands...

LEE C.

Moore

CORPORATION

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. . . a complete line of drilling masts . . .

. . . by Lee C. Moore . . . masts designed, engineered and constructed from long experience in building the right mast to meet every drilling problem.

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on drilling success when you use BAROID chemicals

Baroid chemical additives are the blue chip products of the drilling mud industry. Drillers everywhere rely on these Baroid chemicals specifically designed for mud success.

To control viscosity, gel strength, and filtrate, and overcome the harmful effects of contaminants, use these specifically designed Baroid chemicals:

ANHYDROX *(barium carbonate)*
BAROFOS *(sodium tetraphosphate)*
CARBONOX *(organic thinner and emulsifier)*
HYDROCARB *(alkaline-Carbonox)*
HYDROTAN *(alkaline-tannate)*
LIGNOX *(calcium lignosulfonate)*
MAN-TAN *(mangrove tannin)*
SMENTOX *(specific for cement contamination)*
TANNEX *(quebracho compound)*

Baroid's service engineer can determine the specific chemicals best suited to treat your particular mud to save drilling time and reduce total mud costs. Specify Baroid chemicals.

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BAROID

BAROID DIVISION • NATIONAL LEAD CO.
Main Office: P. O. Box 1675, Houston 1, Texas

engineer in 1947. Nimtz was a technical assistant with Pacific Gas & Electric Co. before joining Rockwell in 1952.

National Supply Forms Mexican Subsidiary

Formation of a Mexican subsidiary has been announced by National Supply Co., Pittsburgh. Known as National

E. M. GRETZLER

J. M. ESTROP

Supply Co. of Mexico, S. A., the subsidiary will have its headquarters in Mexico City. The Mexican company will be managed locally by two vice presidents, Edward M. Gretzler and J. M. Estrop.

The Mexican organization was formed to provide better service to customers in that country, which has become increasingly active in drilling and oil production.

Gretzler started with National Supply in 1919. After service in the Mid-Continent area and New York City, he went to Roumania in 1927, becoming manager of that branch in 1929. He returned to the New York office in 1937 and in 1946 was named vice president in charge of export sales of National Supply Export Corp. He became sales manager of the export division when it replaced Export Corp. in 1952.

Estrop, born in Taninul, Mexico, has had a long and close association with the petroleum industry. He worked for National Supply Co. in the old Tampico days of the 1920's, when National Supply maintained a warehouse there. Since 1948 Estrop has been National Supply Co. representative for Mexico, with headquarters in Mexico City.

Welex Names Brown Ass't. Manager at Bartlesville

James E. Brown has been appointed assistant manager of the Welex district office in Bartlesville, Okla., the oil-well service company has announced.

Brown has been engaged in oil-well service work over 7 years and has spent over 6 of these years with Welex. He has worked up through a a succession of positions with the company, having started as a rigman. Until his recent promotion, he was district sales engineer at Bartlesville.

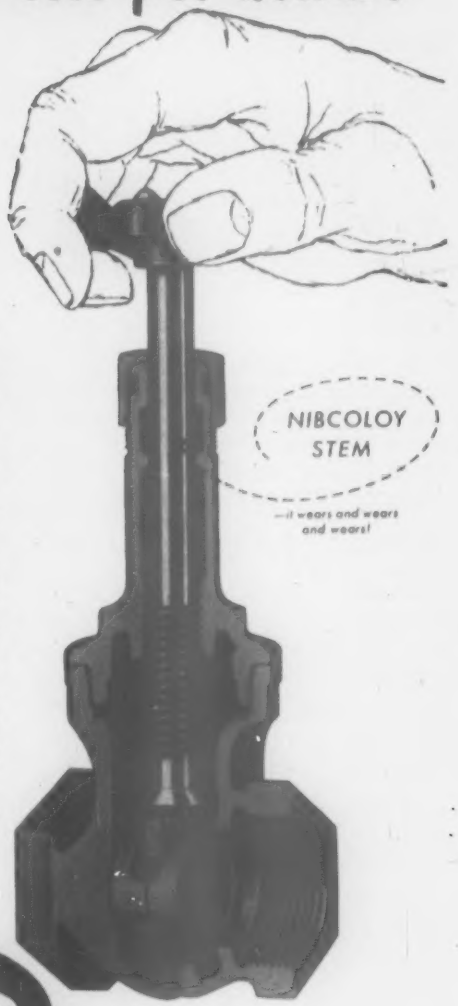
Hill Joins McKee & Co. As Process Coordinator

Luther R. Hill, petroleum and chemical engineer and formerly president of Process Designs, Inc., has joined Arthur G. McKee & Co. as process coordinator of the petroleum division. Hill started his business career as a chemical engineer in the plant control laboratory of Texas Pacific Coal & Oil Co. in Fort Worth. He joined M. W. Kellogg Co. in 1929, serving as process and project engineer, and advancing to process manager, project manager and head of the processing department, which position he held when he left Kellogg in May 1952 to form Process Designs, Inc.

Edward's Denver Office to Cover North, South Dakota

Earl N. Stone, Edward valve sales engineer in Colorado, Utah, western Kansas, Montana, Wyoming, and the Farmington, N. M., area, has been assigned the additional territory of North and South Dakota, according to

More shut-offs per dollar!



Globe or gate, solder cup or threaded . . . you get extra value with NIBCO pressure rated valves. That's because their Nibcoloy stems permit the cutting of accurate long-wearing threads, are high in tensile strength, and are non-corrosive. Then, too, valve bodies are 85-5-5-5 alloy in accordance with A. S. A. standards. In fact, NIBCO valves meet or exceed all performance standards . . . with SWP and WOG pressures clearly marked on side of the body. And they're made by valve specialists — in a plant devoted exclusively to the manufacture of valves.

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Elkhart, Indiana

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PRESSURE RATED VALVES

HIGH POWER—LOW WEIGHT

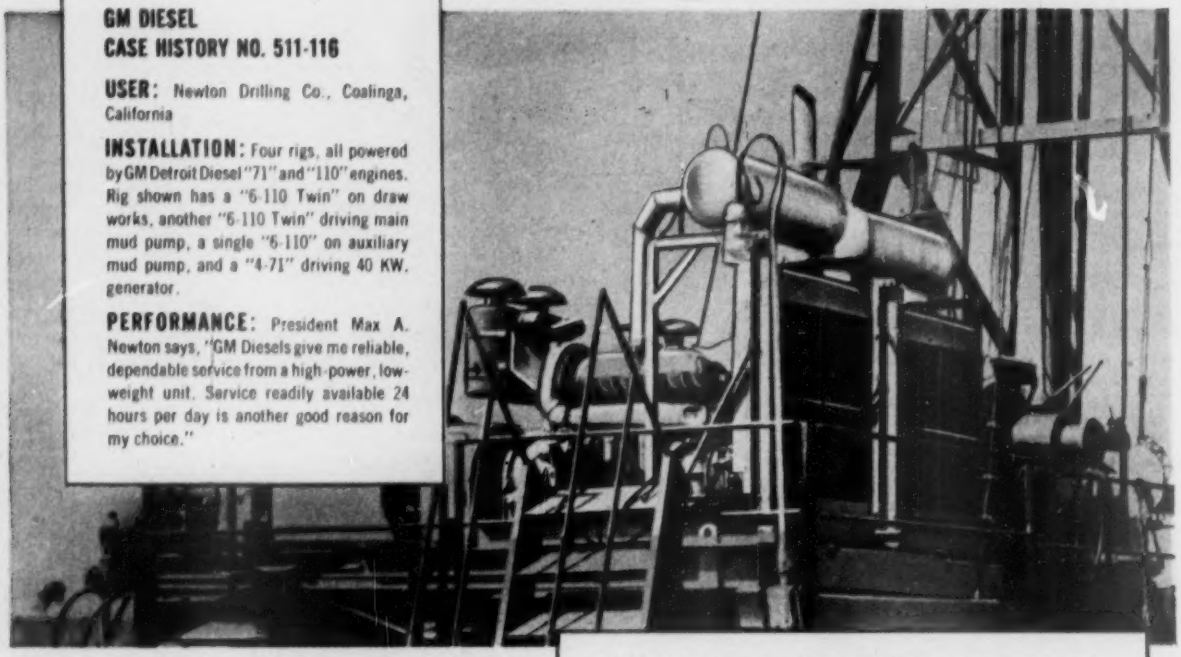
100% Standardized on GM Diesel

GM DIESEL
CASE HISTORY NO. 511-116

USER: Newton Drilling Co., Coalinga, California

INSTALLATION: Four rigs, all powered by GM Detroit Diesel "71" and "110" engines. Rig shown has a "6-110 Twin" on draw works, another "6-110 Twin" driving main mud pump, a single "6-110" on auxiliary mud pump, and a "4-71" driving 40 KW. generator.

PERFORMANCE: President Max A. Newton says, "GM Diesels give me reliable, dependable service from a high-power, low-weight unit. Service readily available 24 hours per day is another good reason for my choice."



WEIGHS less, costs less, makes hole faster.

This is the story behind the success of General Motors Detroit Diesel engines in drilling. These power-packed, 2-cycle work-horse engines have proved themselves on hundreds of drilling rigs by ringing up performance records that are the talk of the industry.

If you're buying a new rig—or repowering your present one—it will pay you to specify GM Diesel. Both Series 71 and 110 units, available with integral GM torque convertors, weigh far less than other Diesels of equal horsepower.

Your GM Diesel Distributor can give you full details on these dependable, moneysaving engines. Call him today or write direct.

Sing's Engines . . . 30 to 300 H.P. *Multiple Units . . . Up to 893 H.P.*

America's Largest Builder of Diesel Engines

JIMMY DIESEL'S MAINTENANCE TIPS

Preventive maintenance helps you avoid costly breakdowns by spotting small troubles before they get to be big ones. Your GM Detroit Diesel Distributor has this Log Book available. He will help you set up a preventive maintenance program and supply you with factory-engineered parts installed by factory-trained servicemen. Call him today—and remember, Preventive Maintenance Doesn't Cost—It Pays.

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Engine Division
of General Motors
Detroit 28, Michigan

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CALIFORNIA—Berkeley
WEST COAST ENGINE & EQUIPMENT CO.
Los Angeles
ANDERSON-O'BRIEN CO.

COLORADO—Denver
THE COLORADO BUILDERS' SUPPLY CO.
Fort Morgan
D & H DIESEL POWER, INC.

ILLINOIS—Mt. Carmel
WESTERN SERVICES, INC.

KANSAS—Great Bend, Wichita
DIESEL EQUIPMENT CO.

LOUISIANA—Alexandria
UNITED ENGINE CO.
Harvey
GEORGE ENGINE CO., INC.
Shreveport
UNITED ENGINE CO.

MICHIGAN—Detroit, Grand Rapids
PENINSULAR DIESEL, INC.

MISSISSIPPI—Jackson
TAYLOR MACHINERY CORP.

MISSOURI—St. Louis
WESTERN MACHINERY & ENGINE CO.

NEW MEXICO—Albuquerque
HARRY CORNELIUS CO.

NORTH DAKOTA—Williston
GENERAL DIESEL EQUIPMENT CO.

OKLAHOMA—Oklahoma City, Tulsa
DIESEL POWER CO.

TEXAS—Corpus Christi, Dallas, Houston, Lubbock, Odessa, San Juan
STEWART & STEVENSON SERVICES, INC.

UTAH—Moab, Salt Lake City
CATE EQUIPMENT CO., INC.

WYOMING—North Casper
WESTERN OIL TOOL & MFG. CO., INC.

IN CANADA—Distributors in all key locations, under
GENERAL MOTORS DIESEL, LTD.
London, Ontario

R. A. Durand, sales manager of Edward Valves, Inc., East Chicago, Ind., subsidiary of Rockwell Manufacturing Co.

Stone is introducing the Rockwell-built Edward Mudwonder valve for oil drilling mudlines to the Rocky Mountain area. He also handles the complete Edward line of cast and forged-steel valves for service in steam-power stations, boiler piping, refineries, chemical and industrial plants.

Goodyear Is Hewitt-Robins Executive Vice President

Austin Goodyear, vice president and general manager of the industrial rubber, machinery, and engineering divisions of Hewitt-Robins, Inc., has been promoted to the position of executive vice president of the company.

Goodyear joined Hewitt-Robins in 1941, starting in the production department of the company's Passaic, N. J., plant. He left the company in 1943, returned to the production department of the plant in 1946, and was appointed production manager in 1947. He was transferred from production to sales in 1948 as assistant to the vice president in charge of sales. He was named as assistant division general manager in 1952 and in the following year was made general manager. He was elected a director in August 1952 and a vice president in August 1953.

Librascope Names Kittleson As West Coast Distributor

In line with expanding activities in commercial and industrial production, Librascope, Inc., Glendale, Calif., manufacturers and designers of computers, automatic controls, and electronic components, announces the appointment of Kittleson Co., Los Angeles, as manufacturers' representatives for the West. The territory in which Kittleson Co. will represent Librascope comprises the entire states of California, Arizona, New Mexico, and Nevada.

The Kittleson firm and its head, Harold A. Kittleson, are well known in the electronics industry. For a decade they have represented many of the country's leading electronic equipment organizations.

In addition to maintaining offices in Los Angeles and San Francisco, Kittleson Co. sends out two special "Road Shows" annually. These presentation

New ...a powerful weed and grass killer prevents regrowth!

UREABOR

You get Full Season's Control from One Application!

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APPLY DRY

The new PCB Spreader is made for easy and efficient application of Ureabor. Available at $10.75—delivered—anywhere in the U.S.A.

Use UREABOR to destroy vegetation about fence lines, wall sills, pipe lines, refinery buildings, heater units, tank batteries, and all places where ground must be kept bare.

Write for literature today!

NOTHING TO MIX

NO WATER TO HAUL

NONPOISONOUS
When applied as directed

NONCORROSIVE
To ferrous metals

PACIFIC COAST BORAX CO.

and demonstration safaris will now include the latest products from Libra-scope.

H. J. Schlarb Joins Emsco To Head Swivel-Joint Sales

H. J. SCHLARB

H. J. Schlarb, an authority on swivel joints and fittings, has joined Emsco Manufacturing Co. as sales manager of the swivel - joint division, according to an announcement by W. C. Kinder, vice president of Emsco. Schlarb has been assistant sales manager, southern California district manager, and special representative of Chiksan during the past 11 years.

Emsco is one of the leading manufacturers of oil-field drilling and pumping equipment and maintains large, modern plants in Los Angeles, Calif., and Houston and Garland, Tex.

Insul-Mastic Appoints Cox as Sales Manager

C. N. COX

The appointment of Clifford N. Cox as sales manager for the company's line of protective coatings and insulation has been announced by H. L. Stockdale, president of Insul-Mastic Corp. of America. Prior to joining Insul-Mastic, Cox held positions of sales manager and eastern division manager for D. A. Stuart Oil Co. of Chicago. Previous association was with Archer-Daniels-Midland Co. as manager, specialities division.

Bethlehem Supply Opens New Store at Farmington

Bethlehem Supply Co. announces the opening of a new and modern store at Farmington, N. M., conforming with the Bethlehem policy of extending complete service to the oil industry wherever and whenever needed.

The new store is under the supervision of E. R. Phillips, district manager at Amarillo, Tex. E. S. Edwards, formerly assistant store manager at Odessa, Tex., is the store manager. D. H. (De) Richardson and D. W. Crossan are the field representatives.

The new store, located on the New Mexico State Highway 550, approxi-

ELIMINATE METER ERROR
REDUCE MAINTENANCE COST
IMPROVE PROCESS CONTROL
SUBDUE PIPELINE VIBRATION
AUGMENT PUMPS & COMPRESSORS

WITH

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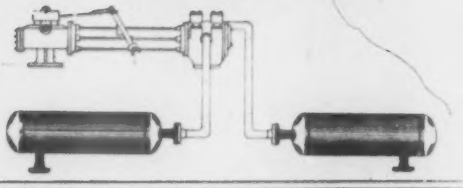

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Santa Paula, California

P. O. Box 429 Phone 4

USE KINZBACH WHIPSTOCKS TO SIDETRACK YOUR HEADACHES

Kinzbach Whipstocks can be set at any depth and require no support for the bottom. Positive setting slips prevent slipping or turning in the hole. The Kinzbach hinge arrangement assures that the top of the Whipstock will be close against pipe wall at all times, permitting easy passage of drilling tools. Setting trigger always locates the Whipstock between couplings so that the window will be within one joint. Kinzbach Whipstocks are available in all popular casing sizes through your supply store.

KINZBACH TOOL CO. INC.

Export Office:
74 Trinity Pl.
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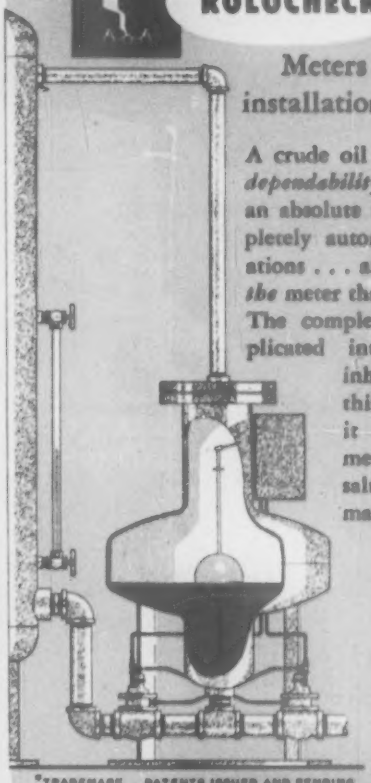
KINZBACH TOOL CO., INC. • P. O. BOX 277 • HOUSTON, TEXAS

PLANNING AN AUTOMATIC PRODUCTION INSTALLATION?

*ROLOCHECK Meters make such installations possible . . .



A crude oil meter of proven *dependability* and *accuracy* is an absolute necessity in completely automatic lease operations . . . and Rolo now has *the* meter that fits the picture. The complete lack of complicated internals and the inherent accuracy of this new meter make it a "natural" for metering crude or salt water in automatic operations.

*TRADEMARK PATENTS ISSUED AND PENDING

The ROLOCHECK Meter can be supplied with electrical or pneumatic pulse transmitters, to transmit metered volumes to remote counters or recorders.

Consult your nearest representative or write us for information on ROLOCHECK Meters or Rolo Wellcheckers employing ROLOCHECK Meters.

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MANUFACTURING COMPANY

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EXPORT OFFICE: R. S. Stokvis & Sons, Inc., 17 Battery Place, New York, N. Y.

"What do they mean by the 'Pritchard Team', Scotty?"

"What makes you ask?"

"I was just looking at this Pritchard ad, and it says, 'Ever See the Pritchard Team in Action?' and then it goes on to say, 'designers, engineers, construction superintendents work *with* your staff all the way from drawing board to on stream.'

"I keep forgetting that you've never seen Pritchard at work on a job. What they mean is that the Pritchard people work as a unit. And they work very closely with their clients' personnel, from the planning stage right down to the finished job. I've worked with them before, and I know why they call it a 'team'."

"I can see that you're sold on Pritchard, aren't you, Scotty?"

"You bet I am, and you will be too, when you see the Pritchard team in action."

"That'll be soon, too! They're working with us on our new plant."

J. F. PRITCHARD & CO.
4625 Roanoke Parkway, Kansas City 12, Mo.

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Pritchard is ready to serve you now in the following Petroleum Processes!

OIL FIELD PROCESSING

- Pressure Maintenance
- High and Low Pressure Recovery Systems
- Crude Stabilization
- Natural Gas Dehydration
- Sulphur Removal
- Light Hydrocarbon Recovery
- Elemental Sulphur Recovery
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REFINERY PROCESSING

- Distillation and Recovery Systems
- Thermal Reforming
- Cracking and Viscosity Breaking
- Catalytic Reforming
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PLUS . . . many types and facets of refinery offsite facilities construction.

Write for TIOGA Brochure

TIOGA

This interesting booklet describes and illustrates the Signal Oil & Gas Company's natural gasoline, H_2S removal and sulphur recovery plant at Tioga, N. D. Write for your complimentary copy on your company letterhead.

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mately 1½ miles northeast of Farmington, is staffed with trained personnel and will maintain a well-rounded stock of drilling, production, and pipeline equipment and supplies for the current oil-field activities.

Minnesota Mining Appoints Curtis to West Coast Area

Appointment of Robert V. Curtis as West Coast representative for Minnesota Mining & Manufacturing Co.'s oil-industry-products group has been announced.

Curtis will be responsible for the promotion of Kylo brand products for the oil industry, including mud-treating chemicals. He will headquarter at the company's Los Angeles branch office.

Napco Names Wicker to Head Federal Truck Sales

R. L. WICKER

Robert L. Wicker, for the past 3 years general sales manager for Dart Truck Co., has been appointed sales manager for Federal Motor Truck Division of Napco Industries, Inc., according to Roy E. Mullin, general sales manager of Napco. In his new position, Wicker will concentrate on sales of equipment such as crane carriers, four-by-fours, six-by-sixes, and other specialized transport machinery.

Wicker began his sales career with the Columbia Steel Division of United States Steel in San Francisco, where he rose to the position of sales promotion manager. He later went into business for himself, exporting construction equipment and petroleum products to the Far East.

Link-Belt Opens District Office in Shreveport

G. A. STONE

Link-Belt Co. has opened a new district office in Shreveport, La. Gerald A. Stone has been appointed district manager. The territory to be served by this new office will include northern Louisiana, southern Arkansas and 14 neighboring counties in Texas, according to Allan Craig, Houston, general manager of the Link-Belt Southwest division. Stone formerly had responsibil-

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PERFECT SEAL

Unions

HOT FORGED from solid, rectangular steel bars, designed and produced for dependable, long-life service under the severest piping conditions!

A TYPE FOR EVERY USE!
FOR ALL PRESSURES!
FOR ALL TEMPERATURES!

Standard & Double Extra Heavy
UNIONS
Available with screwed or socket weld ends. 3000-lb. sizes ⅛" to 3"; 6000-lb. sizes ⅛" to 2".

ORIFICE UNIONS
With screwed or socket weld ends. 3000-lb. and 6000-lb. service.

MALE & FEMALE UNIONS
With steel-to-steel, bronze-to-steel, stainless steel-to-steel or orifice seats. 3000-lb. service only.

Standard & Double Extra Heavy
LUG NUT UNIONS
Hammer-type for quick opening and quick closing.

Write for Catalog 11 showing the complete Catawissa line of Perfect Seal Products

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Send for FREE Bulletin

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Box 1851, Long Beach 1, California

Please send immediately a copy of your new Visible Wedge Bulletin.

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Company_____
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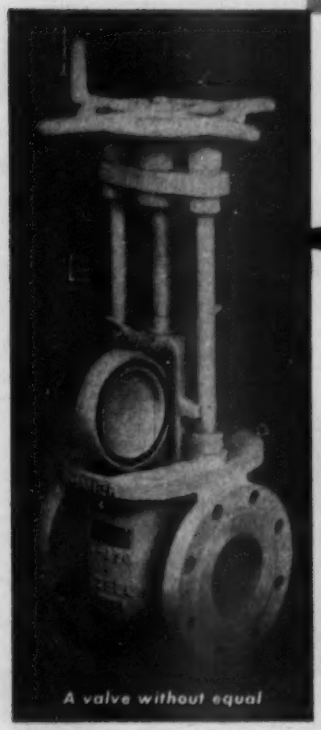


A valve without equal

New Hamer VISIBLE WEDGE

The finest positive sealing valve ever developed

New SURE-SEAL SHUT-OFF
Combining precision metal-to-metal fit of wedge and seats augmented by dependable seal rings, the new Visible Wedge provides the impenetrable sealing action of a Line Blind, yet maintains the simplicity of operation found in a gate valve.

The new Hamer Visible Wedge is available in Straightway, Tee, and Ell styles meeting all A.S.A. specifications.

New STABILITY
Hamer Visible Wedge Valves are absolutely rigid. No line movement necessary to open or close valve.

New SIMPLICITY
"Full-view" wedge. One glance determines whether line is full open or full close.

New SAFETY
Operator has complete control of the wedge at all times. Wedge pivots—no hand lifting necessary.

Hamer **VALVES, INC.**
2919 Gardenia Ave., Long Beach 6, California
Representatives Throughout the World.

ity for sales in much of this territory from the Link-Belt district office in Dallas.

Much of the conveying equipment furnished in the Southwest area is made in Link-Belt's new plant in Houston, which was completed in 1949. Stone, who heads the new office, joined Link-Belt Co. in 1945. Also assigned to the Shreveport office will be Hunter McKay, Link-Belt sales engineer, who was also formerly assigned to the Dallas office.

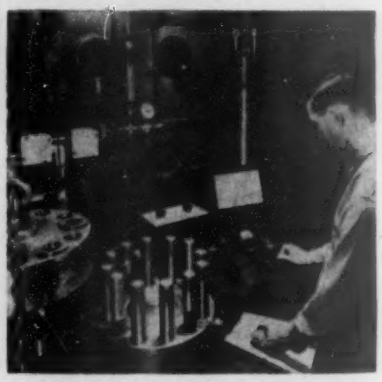
A. D. Lee Announces New York Office for Two Firms

J. W. REAGAN

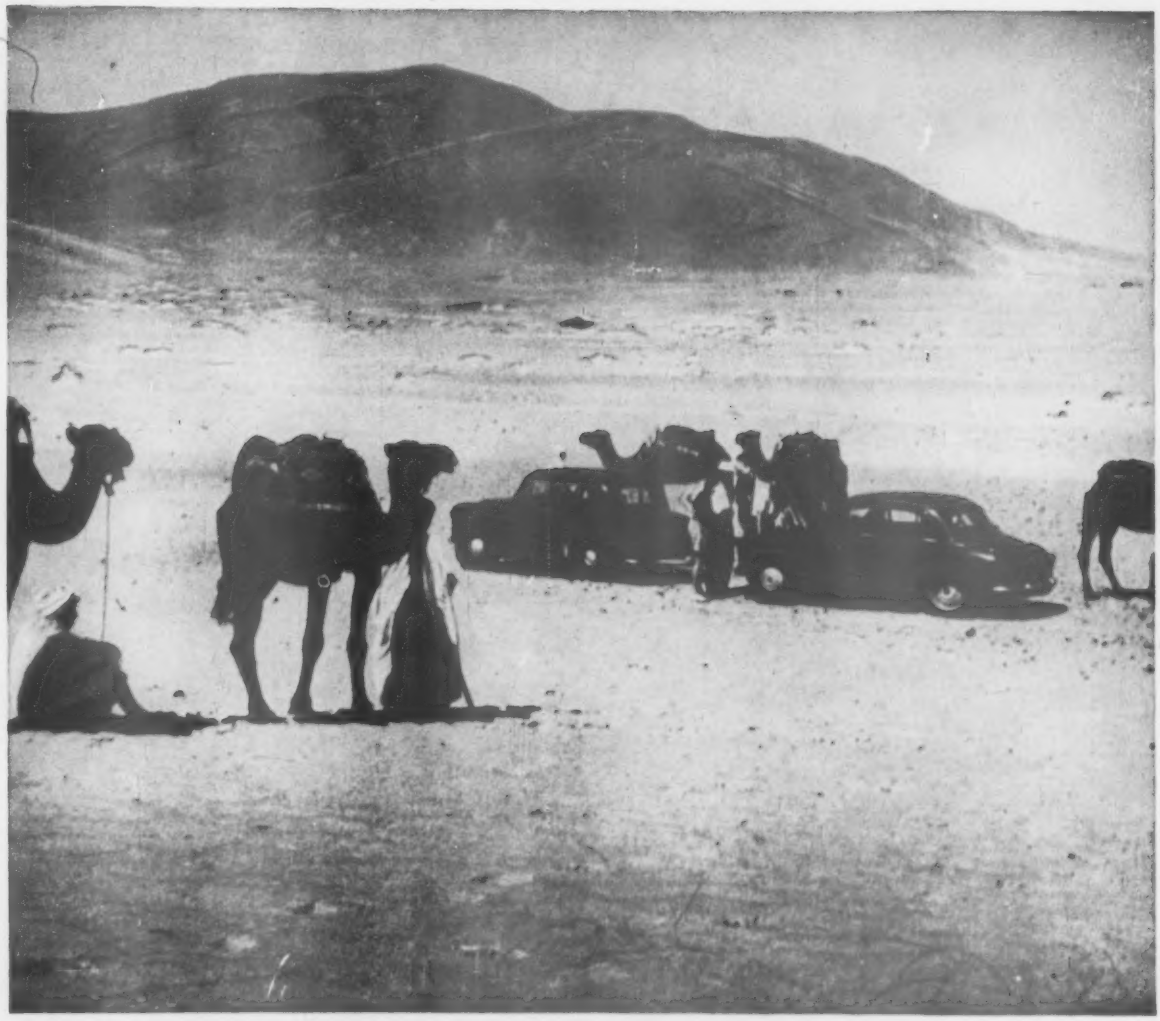
A. D. Lee, president of Lee Construction Corp., export crating firm, Lee Shipping Co., foreign forwarders, and Lee Corp., crane and industrial rental equipment, Houston, Tex., has announced that these firms will expand facilities to better serve clients in the New York area by opening a New York office under the management of John W. Reagan.

Reagan is well acquainted in the export field, having been outward-freight manager for Fern-Ville Far East Line's Gulf/Far East service prior to joining the Lee organization.

C. F. Braun Installs Bolt Stress Vessel



A model of a high-pressure vessel closure designed for use in measuring stresses in the bolts when pressures up to 16,000 psi. are applied, guides the design of closures for C. F. Braun & Co. in its Alhambra, Calif., laboratory. Stresses measurements are made by means of SR-4 resistance wire strain gages bonded on four bolts which are spaced 90° apart. Strain gages are connected into a Baldwin-Lima-Hamilton SR-4 strain indicator which will measure bolt stresses when the top of the closure (left) is properly seated on the sealing gasket and either gas or liquid pressure is applied to simulate process conditions.



BP TESTS IN THE SAHARA

DRIVING an average of 1,000 miles a day for 16 days, a team of technologists from the BP Sunbury Research Station has been testing specially blended fuels to assess performance in hot climates. On desert tracks in the Sahara. On steep climbs in the Atlas Mountains. At high speeds. In gruelling temperatures up to 110 degrees in the shade.

Continuous research into every stage of the production, refining and use of oil is part of the unequalled service of which the BP Shield is the symbol : a service to millions of motorists in Britain, in Western Europe and in many other parts of the world.

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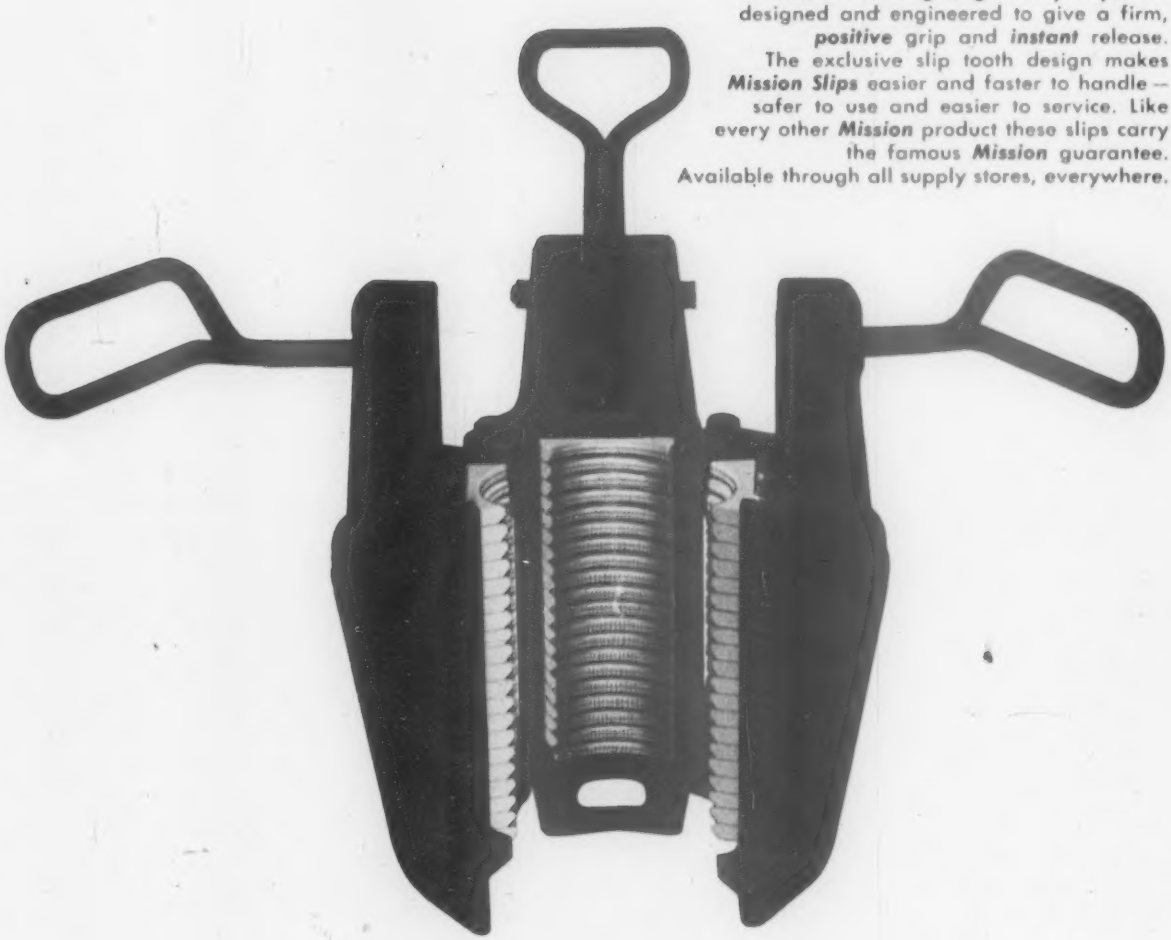

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Standolind Oil & Gas Company's Worford Gas Unit B #1, Ignacio Field, LaPlata County, Southwest Colorado. Drilling Contractor: Reading and Bates, Tulsa, Oklahoma

CEMENTING DATA ON THIS WELL

Well drilled to 5060′ by conventional methods. High pressure gas sand at 2500′. 9⅝″ pipe set to 5047′ and plug drilled conventionally to 5060′. Natural gas at 200 to 250 psi was then used instead of drilling mud to a total depth of 7707′. 7″ pipe was then run to 7689′ and cemented with no fluid in the hole. 10 bbls. of water, 150 sacks of Unaflo and 130 bbls. of water that followed were the only liquids introduced in this well after 5060′. The 130 bbls. of water were left in the casing on top of the plug. Bottom-hole temperature was determined to be 312°F but from all indications the Unaflo cement did not dehydrate or flash-set, and another successful Unaflo job was completed under difficult conditions. The hole was then drilled out through producing formation to 8007′ using natural gas.

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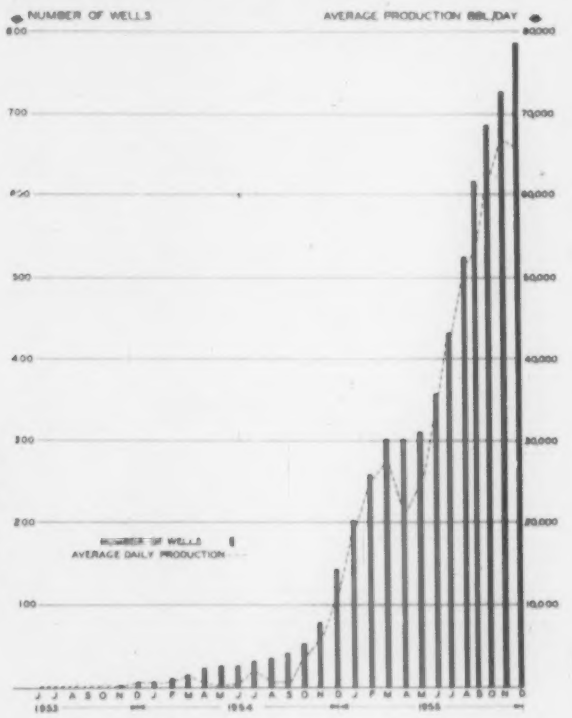
EXPLORATION

Pembina Could Pose a Problem

by Frank J. Gardner



Pembina field has more than doubled in size and productivity in the past 6 months. Forecasters believe it will double its present size again in 1956. In the next 4 years, the field could conceivably produce 400,000 bbl. daily.

ALBERTA'S giant Pembina area was in the news this week, as a new outpost producer stretched its limits another 3½ miles northwest. The California Standard Co. Cynthia NE 4-25 (LSD 4, 25-50-12w5) has been placed on production as the first success on the operator's $10,500,002 Cynthia block. No details on the flow or producing depth have been released, but that fails to dim the importance of the well. It is known that it was carried to total depth 7,010 ft., and its position near the —2,600-ft. contour on the Cardium sand indicates that it should have topped that pay horizon at approximately 5,822 ft. This is about 200 ft. deeper than the average well in Pembina field proper.

New territory . . . In addition to this one producer, Cal Standard has three other outposts on the active list. These lie in a straight north-south line south of the new oil well, and the odds now favor all of them to produce from the Cardium. (See map on page 119). If so, at least 12 sections of productive territory will be added to the west side of the greater Pembina area.

This is the way Pembina has grown —by leaps and bounds. The chart on this page tells the story. Since mid-1955, the number of wells in the field and the total daily production have more than doubled. On January 1, 1954, the field had only 1 well; a year later, there were 140 wells producing 10,000 bbl. a day; but as 1956 dawned, operators had finished 784 wells and were producing 66,214 bbl. daily. This was a record accomplishment for Canadian field development, and it was the more remarkable because of the obstacles that stood in the way. Tricky terrain, inaccessible locations, and two swift, unbridged rivers were formidable enough, but the greatest hindrance of all was weather. Months of steady rain held up operations in 1954, but with the annual freeze in January 1955, the field began to hit its stride.

The Cal Standard block of 92,160 acres was the third "big deal" in the field. At a Crown lease sale in 1954, Imperial Oil, Ltd., paid $11,000,000 for four townships (T51 & 52, R 10 and 11w5) and Texaco Exploration Co. paid $13,000,000 for four townships immediately south of the Imperial block (T49 & 50, R 10 & 11w5). For its wildcatting efforts, Imperial drew a blank, ending up with six dry holes. Texaco, however, was luckier. Eight Cardium producers were completed on its block. At the lease sale in June 1955, bidding was brisk for the leases to the west of Texaco, and Cal Standard was the winner.

And accelerated growth . . . And what lies ahead? Probably an even greater development in 1956 than in 1955. Forecasters now point to at least 800 new wells this year; this would mean 80,000 bbl. per day more from the field. Proved and semiproved area already will accommodate about 4,300 well sites; this means there's room for 3,500 more wells than are already on production. And the field limits are still unknown to the west and south. No well has yet been found water. No well has yet been dry—to the west, that is. How far downdip the pool may continue is open to question, but present production lies between the —1,800 and —2,900-ft. Cardium contours. Plenty of drilling in 1956 may bring an answer, but as of now, it looks as though Pembina may cover a lot more territory than was at first believed.

May pose a problem . . . As the giant grows, a question grows. What are they going to do with the oil? If, in the next 4 years, Pembina becomes a 4,000-well field (and it's not unlikely), it could conceivably produce 400,000 bbl. a day. The total daily average for all of western Canada was 405,000 bbl. in December 1955.

Where will the oil go? Canadians today are pondering that question. But they're optimistic. Rumors of a Sarnia-Toronto pipeline were setting traps for producers' ears this week. If the line materializes, western Canada's oil would be within 318 miles of the 200,000-bbl. per day Montreal market. Canadian eyes are also turned to the south. The United States is their most hopeful market target in the years to come. Under present conditions, such optimism is justified. But Pembina's continued growth could become more a problem than a promise.

Winter slows December's discovery pace, but . . .

Mississippi Gets Discovery of the Year

by John C. McCaslin

MOST of December's exploratory punch was aimed at the Gulf Coast province. Top wildcat success honors went to the State of Mississippi. Marshall Young of Jackson recorded what is probably the most significant discovery of 1955 at a remote wildcat in Hancock County on the Mississippi Gulf Coast. His 1 Cuevas heirs, 25 miles southwest of Gulfport, opened a whole new province to the exploratory drill.

This highly important well flowed at the rate of 2,600 M.c.f. of gas per day with fluid yield of 96 bbl. of 50°-55°-gravity green oil on production tests of an upper Lower Cretaceous sand, believed to be of Washita-Fredericksburg age. Perforations were at 10,840-51 ft. This discovery is believed to be located on a possible southwest nosing of the Wiggins anticline, a major east-west trending structural feature across Mississippi's coastal counties. The well opened first production in any of the three coastal counties.

Nearest Mississippi production is in the Maxie-Pistol Ridge area of Forrest and northern Pearl River counties, nearly 50 miles northeast. In coastal Louisiana, nearest production is at Lake Borgne, 15 miles southwest of Hancock County. There are two wells at Pistol Ridge field believed to be producing from the same zone as the Hancock County (upper Lower Cretaceous). Other Lower Cretaceous production in the southeastern states is from lower zones.

. . . Citronelle. The west offset and second oil well in new Citronelle field, Mobile County, Alabama Lower Cretaceous discovery, was completed.

Zach Brooks Drilling Co. et al 1 Smithers, 26-2n-3w, ¼ mile west of the Citronelle discovery well, flowed 490 bbl. of 45.3°-gravity oil per day on ⅝-in. choke from perforations in the Rodessa sand at 10,880-10,936 ft.

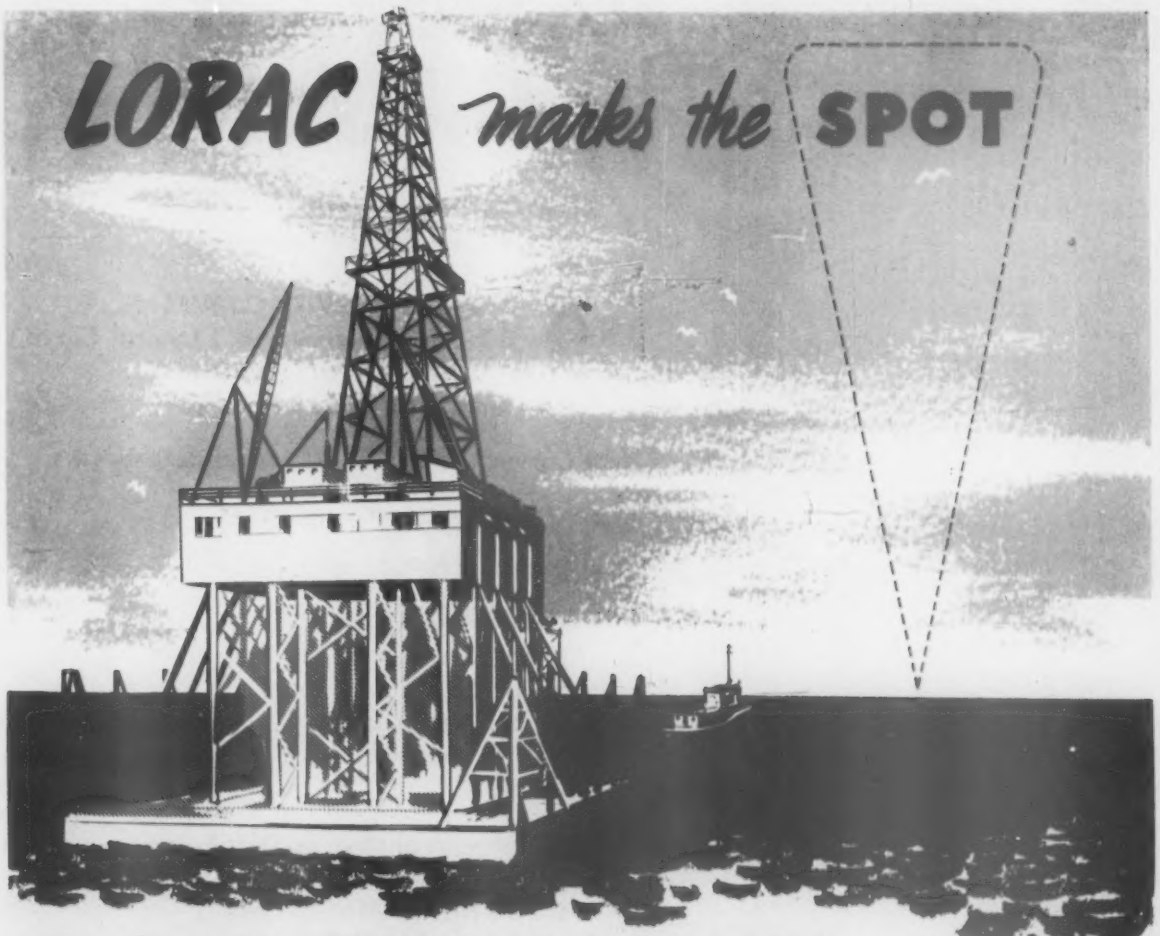
South Louisiana . . . New reserves were added to this region's rich coffers in December. The new South Bosco field on the Acadia-Lafayette Parish line is taking on the aspects of one of the state's most important inland discoveries of 1955.

The California Co. completed its third well in the field for a flow of 519 bbl. of oil per day. The 2 Lafayette Parish School Board confirmed the oil discovery made at 1 School Board, 1,300 ft. west. That well made 566 bbl. of oil per day. Both produce from a 12,100-ft. sand. The discovery well of the field was completed early last spring as a prolific condensate producer from a sand at 13,244-53½ ft.

. . . Offshore record set. The C.A. T.C. Group completed its offshore oil discovery in 97 ft. of water, the deepest ever drilled in the Gulf of Mexico.

The State Lease 953 Unit No. A-1, is in Block 47, Grand Isle area, about 18 miles off the Jefferson Parish coast. It lies about 15 miles south of nearest production.

. . . Terrebonne Parish. A new oil



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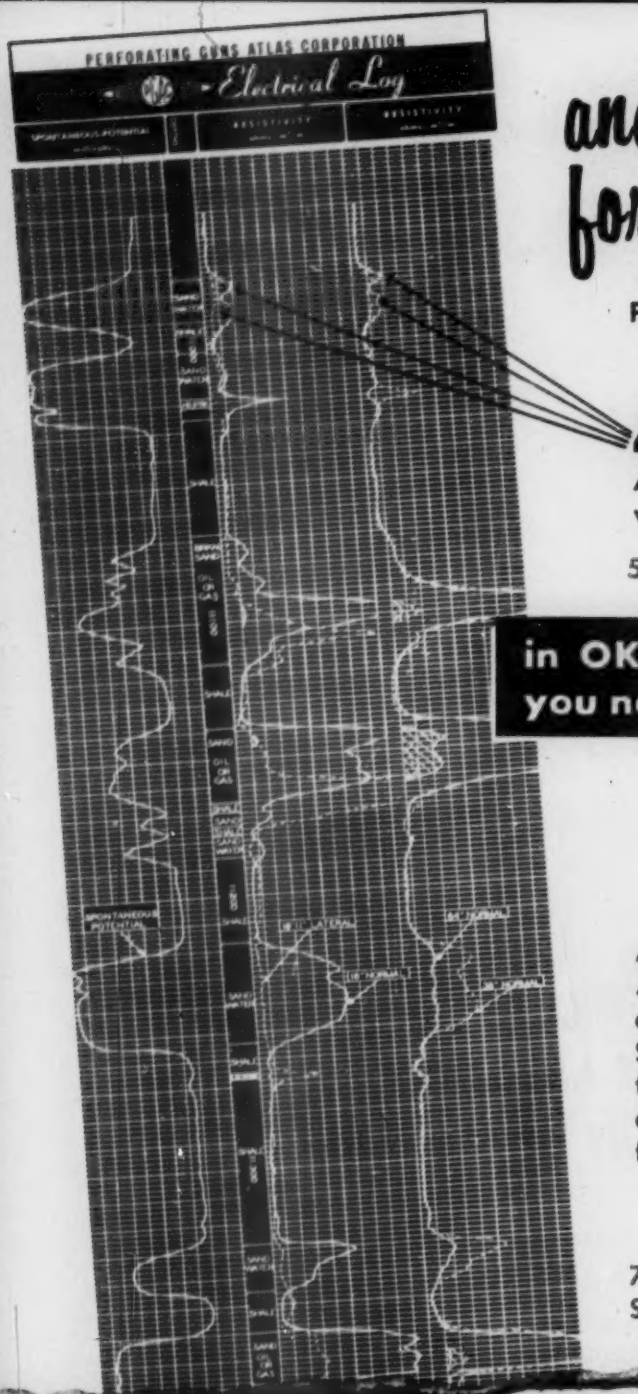

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Total December Completions, Exploration, and Development

	Total completions					Total wildcat wells					Active operations
	Total	Oil	Gas	Dry	Footage	Total	Oil	Gas	Dry	Footage	
Alabama	4	0	0	4	27,433	4	0	0	4	27,433	9
Arkansas	65	36	1	28	203,492	19	2	0	17	67,388	75
California	164	125	2	37	1,133,662	30	1	0	29	181,551	217
Colorado	164	29	14	121	851,963	87	8	1	78	441,053	130
Florida	0	0	0	0	0	0	0	0	0	0	1
Illinois	364	178	2	184	855,489	66	10	1	55	141,180	580
Indiana	51	20	0	31	89,221	10	0	0	10	15,694	70
Iowa	27	0	0	27	57,193	0	0	0	0	0	0
Kansas	424	209	22	193	1,475,161	89	6	1	82	323,958	444
Kentucky	154	75	8	71	200,364	32	1	3	28	48,624	200
Louisiana	322	203	23	96	2,066,969	55	18	1	36	467,697	400
North	170	105	16	49	527,529	26	3	1	22	117,428	120
South	152	98	7	47	1,539,440	29	15	0	14	350,269	280
Michigan	27	6	4	17	85,308	14	0	1	13	45,063	98
Mississippi	24	8	0	16	178,634	10	0	0	10	70,803	35
Montana	47	22	2	23	218,462	19	1	1	17	83,418	75
Nebraska	90	28	0	62	479,998	43	2	0	41	199,120	65
New Mexico	131	53	59	19	518,305	8	1	0	7	55,651	220
Northwest	62	0	57	5	215,775	2	0	0	2	9,547	84
Southeast	69	53	2	14	302,530	6	1	0	5	46,104	136
New York	11	5	0	6	17,599	1	0	0	1	3,599	12
North Dakota	16	12	0	4	129,178	4	1	0	3	21,988	20
Ohio	101	54	18	29	230,066	1	1	0	0	3,212	201
Oklahoma	688	394	34	260	2,306,159	65	8	5	52	261,549	1,100
Pennsylvania	68	9	41	18	214,229	2	0	1	1	14,114	72
South Dakota	0	0	0	0	0	0	0	0	0	0	1
Texas	1,621	1,018	52	551	6,617,014	415	69	12	334	1,976,264	1,432
Southwest (1)	150	91	2	57	373,726	43	1	2	40	147,383	30
Gulf Coast (2)	64	25	8	31	443,547	27	2	2	23	176,790	45
Gulf Coast (3)	103	55	6	42	673,391	29	10	1	18	236,861	180
Southwest (4)	76	33	6	37	398,912	32	8	2	22	175,805	175
East (5 & 6)	84	31	13	40	389,238	31	2	2	27	132,528	115
West Central (7-B)	283	152	0	131	948,102	107	15	0	92	410,685	85
West (7-C & 8)	405	334	3	68	1,958,409	64	11	2	51	364,036	507
North (9)	364	223	4	137	1,093,806	72	14	1	57	267,752	250
Panhandle (10)	92	74	10	8	337,883	10	6	0	4	64,424	45
Utah	13	1	2	10	60,433	10	2	2	8	52,203	35
West Virginia	43	1	32	10	112,182	2	0	1	1	10,043	194
Wyoming	81	26	13	48	444,049	29	1	2	26	178,051	118
Miscellaneous	3	0	0	3	*20,063	3	0	0	3	20,063	0
Total December 1955	4,709	†2,512	329	*1,868	18,590,626	1,018	‡130	32	856	4,709,719	5,804
Total November 1955	4,744	2,598	337	1,809	19,017,977	1,030	146	23	861	5,167,780	5,910
Total 1955	56,682	31,567	3,613	21,502	226,269,636	12,271	1,812	353	10,106	58,958,356	
Total 1954	53,930	29,773	3,977	20,180	218,986,000	11,280	1,598	399	9,283	54,502,000	
Western Canada	255	169	16	70	1,201,929	71	10	11	50	341,160	
Alberta	159	115	12	32	870,804	30	3	7	20	180,080	
Saskatchewan	66	33	3	30	253,844	32	5	3	24	128,054	
Manitoba	26	21	0	5	58,781	5	2	0	3	1,526	
B.C.-N.W.T.	4	0	1	3	18,500	4	0	1	3	18,500	
Total 1955	2,879	1,990	159	730	12,465,130	762	135	89	538	3,760,064	

*Incl. 89 service wells: Kans. 8, N. Y. 4, Ohio 2, Okla. 40, Pa. 8, Iowa 27. †Incl. 37 cond. wells: S. La. 10, Okla. 3, Tex. Panhandle 3, Gulf Coast 14, S.W. Tex. 7. ‡Incl. 13 cond. discoveries: Okla. 1, S. La. 6, Dist. (2) 1, Dist. (3) 3, Dist. (4) 2. §Incl. Idaho 1, 2,338 ft.; Wash. 1, 9,110 ft.; Ore. 1, 7,594 ft. •Incl. 1,021 ft. drilled deeper well in Ga.

discovery 3 miles southeast of prolific Caillou Island field in Terrebonne Parish, at the mouth of Terrebonne Bay, sparked a flurry of deep-drilling activity in this section of Louisiana.

Robert W. O'Meara's 1 Louisiana Land & Exploration Co., located on Timbalier Island, flowed more than 200 bbl. of oil per day from perforations at 10,758½-64½ ft.

West Texas-New Mexico . . . The Permian basin region reported two significant discoveries, one in Lea County, New Mexico, the other in Hockley County, Texas.

Lea County has been the scene of highly successful Devonian exploration in the past few months. In December another Devonian oil strike in Lea added to the area's prospects. Delhi-Taylor Oil Co. 1 Federal-Cline, 12 miles north of Jal, flowed at the daily rate of 228 bbl. of oil from the Devonian at 7,963-8,028 ft.

. . . Hockley. The northern end of the Midland basin received new attention as a result of a heavy oil flow on test of a Pennsylvanian reef section at Honolulu Oil Corp. 19-B Ellwood, 3 miles north of shallow production in Smyer pool. The discovery is 10 miles from similar reef oil in Ropes field.

Southwest Texas . . . Val Verde County in far southwestern Texas is getting another deep wildcat. Stanolind Oil & Gas Co. will drill 1 Wayne West on its West Ranch prospect, about 10 miles northwest of Juno.

This is the sixth deep well to be started or completed in the past 12 months. The county has had little previous drilling activity. Magnolia Petroleum Co. and Humble Oil & Refining Co. are both drilling in the county's northern sector.

Mid-Continent . . . Northern Oklahoma's new basal Pennsylvanian oil and gas-distillate reservoir continued its fast growth in December. New wells in both Grant and Alfalfa counties on the state's northern border pushed the trend up to 30 miles in length along a nearly straight east-west line. Production is from the Red Fork, Cherokee, and Bartlesville sands.

Western Canada . . . One of the best discoveries of the year for Alberta is

Total Depth Classifications, December 1955

	A 0- 1,250 ft.	B 1,250- 2,500 ft.	C 2,500- 3,750 ft.	D 3,750- 5,000 ft.	E 5,000- 7,500 ft.	F 7,500- 10,000 ft.	G 10,000- 12,500 ft.	H 12,500- 15,000 ft.	I Over 15,000 ft.
Alabama	0	1	0	1	1	0	1	0	0
Arkansas	3	28	23	9	2	0	0	0	0
California	0	32	37	25	26	31	12	0	1
Colorado	1	3	2	29	129	0	0	0	0
Florida	0	0	0	0	0	0	0	0	0
Illinois	36	144	182	2	0	0	0	0	0
Indiana	12	32	7	0	0	0	0	0	0
Kansas	3	51	212	147	11	0	0	0	0
Kentucky	94	49	9	2	0	0	0	0	0
Louisiana	8	94	30	16	40	52	50	26	6
North	8	93	26	8	25	7	3	0	0
South	0	1	4	8	15	45	47	26	6
Michigan	0	10	6	10	1	0	0	0	0
Mississippi	0	0	1	4	11	1	6	1	0
Montana	2	20	10	5	3	7	0	0	0
Nebraska	0	0	8	15	67	0	0	0	0
New Mexico	9	31	29	19	36	3	3	1	0
Northwest	1	25	6	1	28	1	0	0	0
Southeast	8	6	23	18	8	2	3	1	0
New York	0	10	0	1	0	0	0	0	0
North Dakota	0	0	0	0	0	16	0	0	0
Ohio	19	23	58	1	0	0	0	0	0
Oklahoma	86	212	193	69	65	44	15	4	0
Pennsylvania	1	44	5	13	1	3	1	0	0
South Dakota	0	0	0	0	0	0	0	0	0
Texas	196	358	314	282	317	111	32	11	0
Southwest (1)	48	42	20	27	9	2	2	0	0
Gulf Coast (2)	0	1	4	4	26	28	1	0	0
Gulf Coast (3)	9	9	6	5	25	38	11	0	0
Southwest (4)	2	10	9	13	35	6	1	0	0
East (5 & 6)	9	14	3	13	43	2	0	0	0
West Central (7-B)	32	101	50	43	56	1	0	0	0
West (7-C & 8)	17	58	113	102	71	19	14	11	0
North (9)	79	114	38	75	46	10	2	0	0
Panhandle (10)	0	9	71	0	6	5	1	0	0
Utah	0	13	0	0	0	0	0	0	0
West Virginia	1	26	7	8	1	0	0	0	0
Wyoming	4	4	30	7	26	13	2	0	1
Miscellaneous	0	26	3	0	1	0	0	0	0
Total December 1955	475	1,211	1,166	665	738	281	122	43	8
Total November 1955	472	1,174	1,194	624	708	351	152	60	9
Total 1955	5,181	13,705	14,679	8,012	8,741	3,948	1,642	675	99
Western Canada	1	41	41	70	77	21	1	3	0
Alberta	0	11	16	37	71	20	1	3	0
Saskatchewan	1	8	21	32	3	1	0	0	0
Manitoba	0	21	4	1	0	0	0	0	0
B.C.-N.W.T.	0	1	0	0	3	0	0	0	0
Total 1955	14	535	639	684	815	152	34	6	0

in evidence at Union Oil Co. and Hudson's Bay 15-15 North Heart River, 40 miles southeast of Peace River and 35 miles north of High Prairie.

The well flowed light-gravity oil at the estimated rate of 480 bbl. per day on test of an unidentified zone just above the granite. Top of the granite was at 6,878 ft.

... Nanton-Parkland. Substantial gas reserves may be added to the Foothills belt region of Alberta as a result of Richfield Oil Corp.'s Mississippian gas-condensate strike at Nanton-Parkland. The discovery well flowed gas at rates in excess of 2,600 M.c.f. per day plus good condensate recoveries on a series of drill-stem tests. Location is on LSD 6, 4-16-27w4, 5½ miles southeast of Nanton and 8 miles northeast of a recent gas discovery made by Texaco Exploration Co. et al. Nanton-Parkland is 48 miles south of Calgary.

Richfield's 6-4 Lind discovery brings to eight the number of gas fields in the Calgary area. Others are: Jumping Pound, a Mobil Oil Co. strike just east of town, the Sarcee Indian Reserve gas area, Okotoks field, Turner Valley, and Savanna Creek. Other important gas areas have been opened north of Calgary in the Olds area.

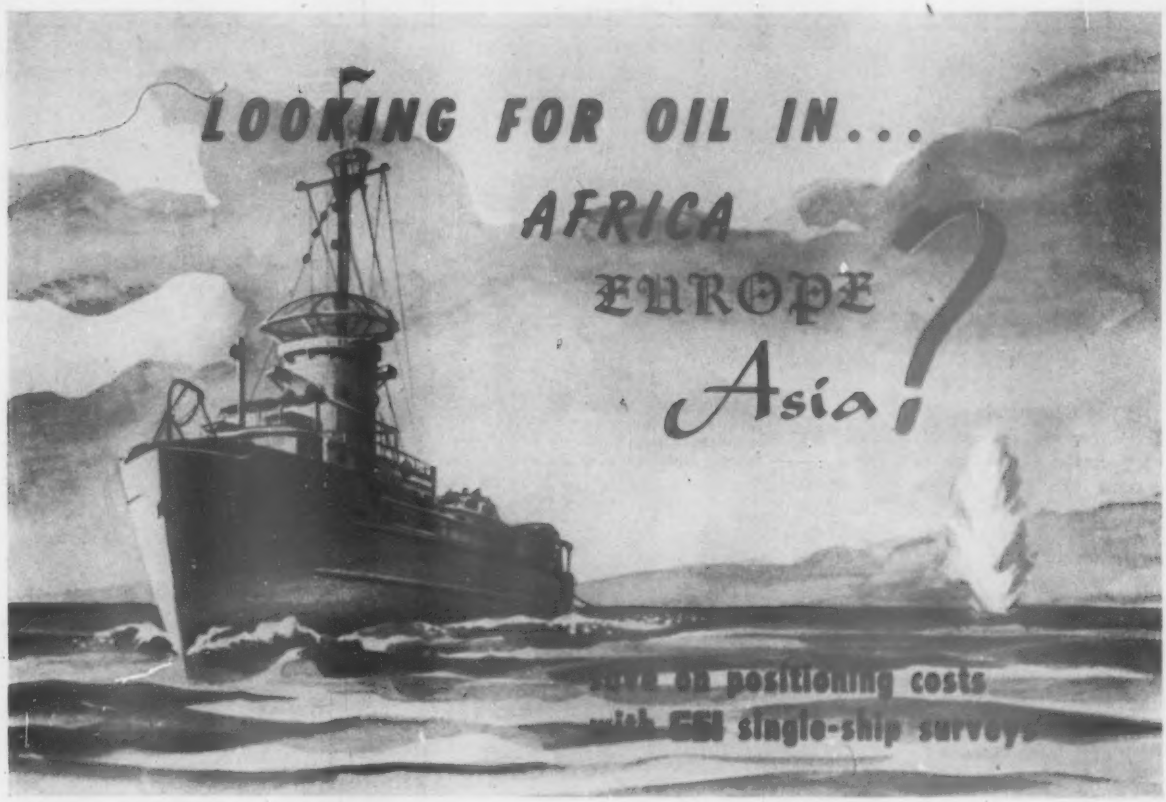
... Burbank discovery. Bailey-Selburn et al reported a good flow of light gravity oil on the initial drill-stem test of the 2-14 Conick Burbank, LSD 2, 14-39-27w4.

The well reportedly had a pay section of 24 ft. Estimated flow rate of the discovery was 1,200 bbl. per day. Location is 7 miles northeast of Red Deer. Production is from the Viking sand. It is 1¾ miles southeast of Imperial Oil's 13-15 Burbank Viking oil discovery and ⅝ mile southeast of California-Standard's 5-14 Burbank extension discovery. At year's end the Bailey-Selburn Burbank well was put on production at 43 bbl. per day.

... Saskatchewan discoveries. Rio-Palmer Oils, Ltd., discovered oil in the Mission Canyon at 16 Woods in the Glen Ewen area of southeastern Saskatchewan.

The well flowed oil at an estimated rate of 50-100 bbl. per hour on initial drill-stem test. Location of the Woods discovery is 12 miles southwest of Rosebank field, 13 miles southwest of Alida field, and 45 miles northeast of the town of Estevan.

Appalachian . . . In Red House Township, Cattaraugas County, New York, northwest of Bradford, Pa., Felmont Oil Corp. found a flow of 8,500 M.c.f. of gas per day at 1 Lena Lockwood, an Oriskany sand discovery. This was one of New York's best hits of 1955.



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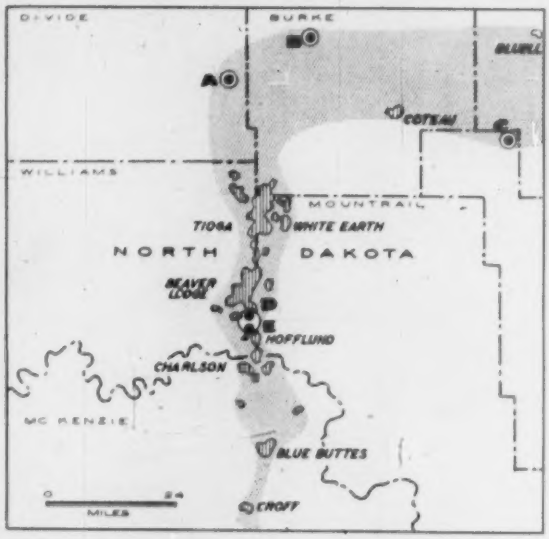
A World of Experience in Finding a World of Oil

EXPLORATION HIGHLIGHTS

Williston Basin Swings Into Action

by John C. McCaslin



FIVE wildcats (keyed to text) are promising big things for North Dakota exploration in 1956.

THE wildcat books for 1955 in North Dakota are closed. The tally for the year was seven new fields and extensions. One took top place in exploratory interest for the basin. The new year is but 4 weeks old and already five wells are opening either new fields or making important extensions to older fields.

New producing counties . . . Two widely separated wildcats, one in Divide County, the other in Ward County, promise first production for these two areas.

Phillips Petroleum Co. is testing at its 1 Braathen (A on map) in the northwestern part of the state. This Mission Canyon prospect, located in Divide County, will lead to increased wildcatting interest in that section of North Dakota. It is about 20 miles north of the northwestern tip of Tioga field.

Calvert Drilling Co. is opening first production in Ward County, 21 miles southeast of Coteau field (C on map). The 1 O'Clair is testing after finding oil recoveries in the Mission Canyon. This important prospect is 50 miles northeast of Tioga field, lying about 15 miles equidistant from Coteau and Bluell fields. Calvert is drilling in this area on a 10-well farmout from Stanolind Oil & Gas Co. Calvert just made location for the ninth in the series at Christiansen in NE NE 22-163n-90w, Burke County. The first well in the package opened Coteau field last year in Burke County. The eighth well in the series is drilling in 30-153n-84w, Ward County. This well, 1 Jacobson, is 50 miles southeast of the 1 O'Clair in rank wildcat territory. Success here would really kindle the exploratory fires in the Williston basin.

Texota Oil Co. started the '56 drilling campaign in North Dakota with indicated success at its 1 Swenson in 22-163n-9w (B on map), 20 miles northwest of Coteau field. This Burke County well will give the county its second oil pool, if successful.

Hofflund-Beaver Lodge linkup? . . . There are indications that Beaver Lodge and Hofflund fields in Williams County will soon be joined together.

Amerada Petroleum Corp. 1 Ferguson in SE NW 32-155n-95 (E on map), was completed for 218 bbl. of oil in 17 hours through 13/64-in. choke. This discovery extended Hofflund field ¼ mile to the north, bringing the field's limits to within 2 miles of the south edge of Beaver Lodge.

Amerada is testing at another well 1¼ miles north of the 1 Ferguson. Samples and logs indicate success at the venture. This well will bring Hofflund field to within 1¼ miles of Beaver Lodge. It is the 1 Anderson in SE NW 29-155n-95w (D on map).

It appears that production will be attained in a series of four fields over a 35-mile stretch with only three narrow gaps, between Tioga and Beaver Lodge, Beaver Lodge and Hofflund, and Hofflund and Charlson fields. Charlson is 1½ miles south of Hofflund across the Missouri River.

Here are the first five contenders for 1956 honors:

● Texota Oil Co. 1 Sarah Swenson, NE SW 22-163n-93w, Burke County. Oil recovered on test of Mission Canyon at 6,166-6,494 ft. More tests under way. Location is 27 miles northeast of Tioga field. Success will give Burke County its second field.

● Phillips Petroleum Co. 1 Braathen, NE NW 29-162n-95w, Divide County. Pump is being installed and testing will continue. Operator swabbed 40 bbl. of oil in 18-hour swab test of Mission Canyon perforations at 7,076-85, 7,089-92, and 6,946-52 ft. Success will give Divide County its first producer and the northwesternmost field in North Dakota.

● Calvert Drilling Co. 1 Earl O'Clair, NW NW 15-160n-87w, Ward County. Operator recovered 615 ft. of clean oil and 410 ft. slightly mud-cut oil on drill-stem test of Mission Canyon at 5,788-5,82[illegible] ft.; 180 ft. of mud and gas-cut oil on test at 5,810-26 ft. Success will give Ward County its first producer. Location is 21 miles southeast of Coteau field.

● Amerada Petroleum Corp. 1 Ferguson, SE NW 32-155n-95w, Williams County. Completed for 218 bbl. of oil in 17 hours from Madison. Extends Hofflund field ¼ mile north, and to within 2 miles of the southern edge of Beaver Lodge field.

● Amerada 1 Anderson, SE NW 29-155n-95w. Testing. Success will bring Hofflund field to within 1¼ miles of Beaver Lodge field.

Here's the discovery story for North Dakota in 1955:

● Newburg field, opened by Amerada Petroleum Corp. at 1 Beauchamp, SE SW 21-161n-79w, Bottineau County. IP 28 BOPD, Spearfish-Triassic at 3,403-11 ft.

● Bluell field, opened by Sohio Petroleum Co. at 1 Ritter, SE NE 23-163n-86w, Renville County. IP 374 BOPD, Charles-Mississippian at 4,500-18 ft.

● Coteau field, opened by Calvert Drilling

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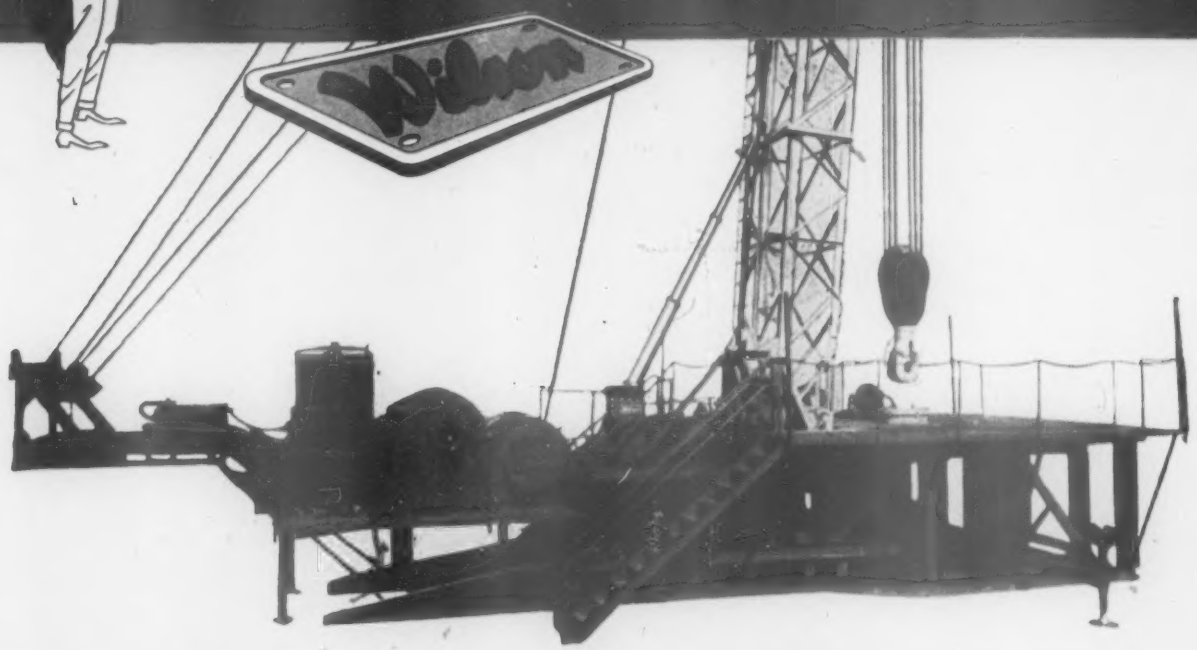
SMOOTH SERVICING



CAPACITY: SERVICING WELLS TO 10,000 FEET With 2½-Inch Tubing, Without Hydromatic Brake — **SERVICING WELLS TO 16,000 FEET** With 2½-Inch Tubing, With 15" Double Rotor Hydromatic Brake . . . **AND NOTE THESE: • FULL AIR CONTROLS • FULL OIL BATH CHAIN DRIVES • LOWER DRUM BRAKE RINGS 42" x 8½" • WILSON QUALITY THROUGHOUT • TORQUE CONVERTER APPLICATION —**

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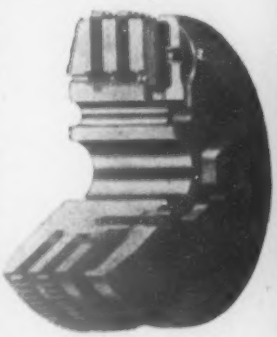

This type of clutch combines all the advantages inherent in air operation, such as convenient remote control, small manual pressure required for full torque, smooth starting and controlled torque. In addition, it gives freedom from self-engagement or reduced capacity, due to centrifugal force, and has much greater torque capacity than radial type air clutches. No packing to leak or let water or oil into the clutch friction surfaces. All air connections are on the outside and easily accessible. This without a doubt the finest clutch yet developed for this type service, providing great capacity in minimum space, no adjustments, practically impossible to burn up. **SMOOTHEST ENGAGEMENT OF ANY AIR CLUTCH!**

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HYDROTARDER: The Mogul unit can be equipped with the 15" Double Rotor Type Hydromatic Brake driven by a chain drive from the countershaft. This brake can be used with either upper or lower drum, and when used on main drum with five lines strung up will absorb a total of 1300 H.P. when dropping the stands at the rate of 60 feet in 12 seconds. This is the equivalent of 16,000 feet of 2½" tubing. The brake is so arranged that it will absorb very little power when taking up the empty blocks and jaw clutch does not need to be disengaged to take up the empty blocks when the trip is completed.

The FIRST NAME in OIL FIELD WINCHES

Co. at Gunner Opseth, NE NW 28-161n-90w, Burke County. IP 40 BOPD, Charles-Mississipian at 6,350-6,486 ft.

● Blue Buttes field, opened by The Texas Co. at 1 Helle, NW NE 8-151n-95w, McKenzie County. IP 313 BOPD, Madison-Mississippian at 9,174-9,386 ft.

● North Souris field, opened by Lion Oil Co. at 1 Carl Skarphol, SE NW 33-164n-77w, Bottineau County. IP 100 BOPD, Mission Canyon-Mississippian at 2,980-87 ft.

● Blue Buttes extension, opened by Amerada at 1 Grimstead, SE SE 19-152n-95w, McKenzie County. IP 244 BOPD, Madison at 8,403-11 ft.

● Hofflund field extension, opened by Amerada at 1 E. Wolfe estate, NW NE 5-154n-95w. IP 49 BOPD, Madison at 8,306-16 ft.

APPALACHIAN

WEST VIRGINIA

In Greenbank district, Pocahontas County, West Virginia, Columbian Carbon Co. is drilling at 3,835 ft. in 1223 U.S.A., wildcat.

● In Clover district, Tucker County, Hope Natural Co. 9967 Walter Hovatter is at 3,506 ft.

● Grade district, Webster County, Nelson W. Taylor, Agt., 1 Victoria Riddle reached a depth of 1,783 ft.

● Union district, Preston County, Columbian Carbon Co. 1217 U.S.A. is drilling in the new hole at 4,268 ft.

PENNSYLVANIA

Banks Township, Indiana County, Southwest Pennsylvania, Columbian Carbon Co. 1831 Farmers & Miners Trust Co., wildcat, is now drilling at 6,320 ft.

● In Young Township, Manufacturers Light & Heat Co. 4336 Stewart and R. & P. Coal Co. shut down at 1,217 ft.

OHIO

Another addition to the development south of New Guilford was completed by W. E. Shrider et al on 1 W. R. Hughes, Section 14, Perry Township, Coshocton County. In a 24-hour test from fractured sand at 3,163-3,211 ft. the well gaged 292 bbl.

● In New Castle Township along the south edge of New Castle pool, Preston Oil 3 F. O. Garrison, 3rd Qr., gaged 90 bbl. and 380,000 cu. ft. gas from fractured sand at 3,183-3,227 ft.

● Frazeysburg pool in Jackson Township, Muskingum County, was widened ¼ mile by Frank Brendel Oil & Gas Co. 1 (2) Harry Williamson, Section 6. Clinton sand at 3,105-39 ft. was fractured and gaged 75 bbl. in the first 24 hours.

EASTERN KENTUCKY

On Sugar Creek in Leslie County, United Fuel Gas Co. have completed their wildcat 22 Fordson Coal Co. as a dry hole. Important geological markers encountered were: Mississippian Big lime 2,160 ft., Devonian brown shale 2,665 ft., Corniferous lime 2,940 ft. and Clinton shale 3,058 ft. Total depth 3,064 ft. Several shows of oil and gas were had, but did not prove to be of commercial value.

PACIFIC COAST

CALIFORNIA

New Pool Discovery For Santa Fe Springs

General Petroleum Corp. has scored what could be a major new deep pool discovery in old Santa Fe Springs field, Los Angeles County, with its 243 Santa Fe. A formation test of the interval 8,947-9,010 fielded 32°-gravity crude at a 1,051 bbl. daily rate before the packer failed. GP was reaming preparatory to running a combination to complete the test. The well site is on the east edge of the field. Prior to this find, the deepest production from the field was from the Hathaway zone at

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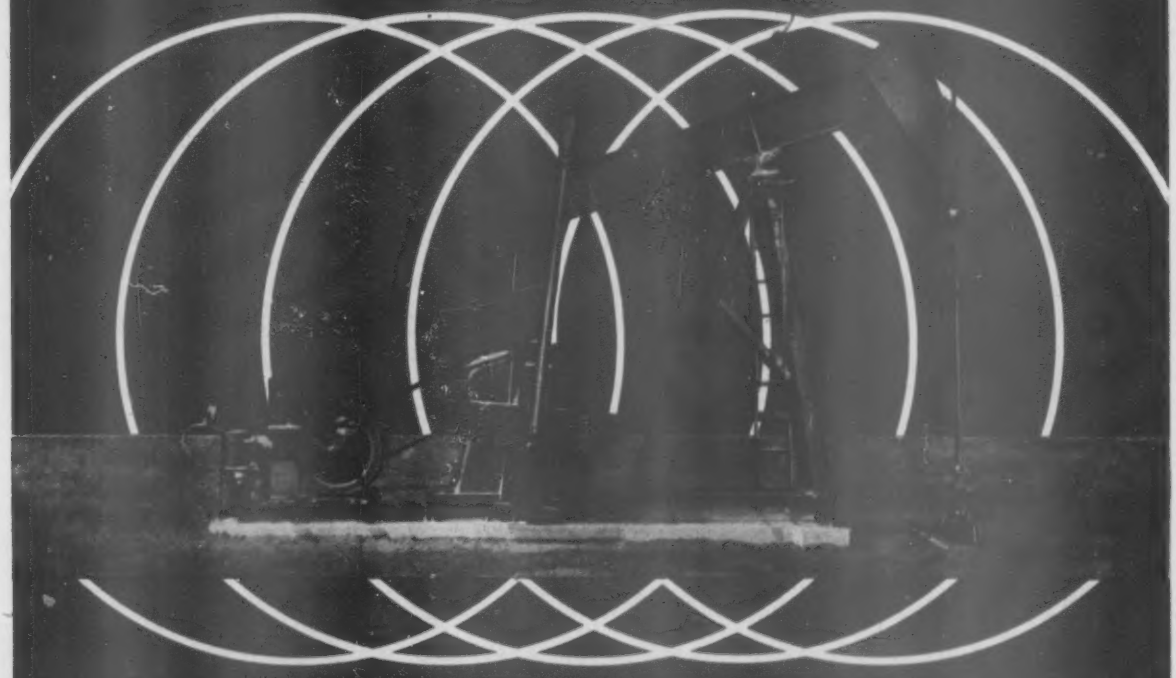

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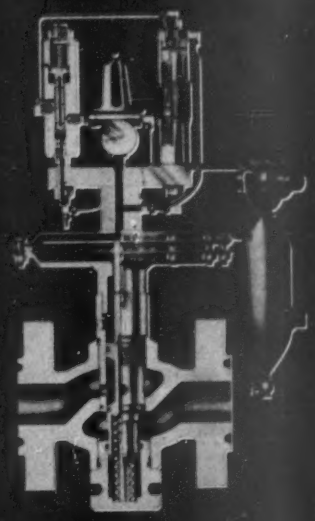

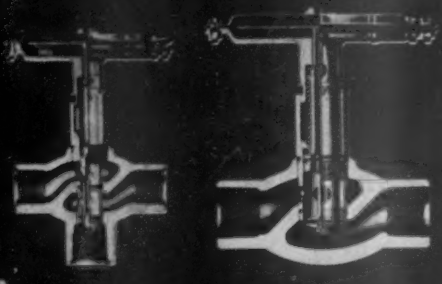

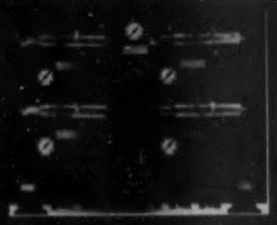

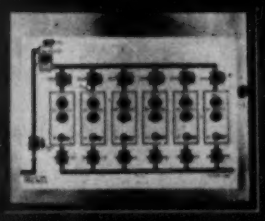

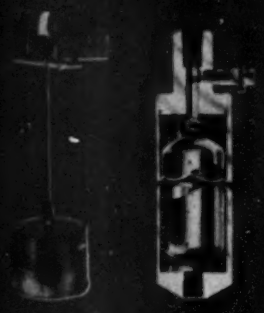

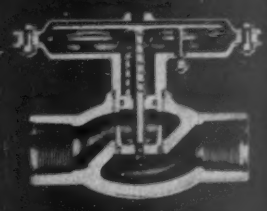

7,950 ft. The first offset to the discovery will be drilled on a site 550 ft. north of 243 Santa Fe.

The field, which was discovered in 1919, has already yielded 560,000,000 bbl. of crude and experienced two big booms.

Polvadero Area Production Extended

Los Nietos Co. was completing an extension test located almost ½ mile north of the Polvadero area production in Guijarral Hills field, Fresno County. This well, 38-36 Short, on a test started flowing at a 1,500 bbl. daily rate from the Gatchell sand at 10,800 ft. The well is located NE SW 36-20s-16e.

Rheem Hits New Pool

A new pool discovery was chalked up by Richard S. Rheem with 67 Standard on the north edge of the Race Track area of Edison field, Kern County. This 6,119 ft. test was completed flowing 50 bbl. daily of 42.2°-gravity crude through a 10/64-in. choke from the perforated interval 4,590-4,619 ft. Production is from a new pool in the Jewett sands. The well site is located SW SE 27-29e-29e. Rheem was moving in a rotary to drill the first extension on a site three locations east and one north of the discovery.

Reserve Fails to Extend Tejon Field Production

Reserve Oil & Gas Co. has failed on another attempt to get a commercial completion 2 miles northwest of regular Tejon field production in Kern County. Reserve abandoned 72-20 Butler-Wehr, NE SW 20-11n-19w, after running an electric log, sidewall sampler and dipmeter on the 8,081 ft. wildcat.

This test was a northeast offset to the C. F. Wehr 63-20 Butler-Wehr which was abandoned last August after pumping 50 to 100 bbl. daily for the first 10 days in August. This earlier wildcat in previously unexplored Section 20 tested the Olcese, Pulv and Valv zones. Olcese production failed to hold up while the other two turned up too much water in the crude.

GREAT LAKES

MICHIGAN

New Dundee oil well in the old Denver pool, Isabella County, Moco 1 Ettinger, NW NW NW 34-15n-3w, pumped and flowed at a restricted rate of 5 bbl. of oil an hour after a 2,000-gal. acid treatment. Well produced 80 bbl. of net oil first 16 hours on net oil production. This new well, off the east edge of the original development in this field, may prove to be the opener of a major extension development of this pool. Moco, immediately after 1 Ettinger was completed, started moving drilling tools to the 2 Ettinger, NE NW NW 34-15n-3w, the 660-ft. direct east offset.

Dundee top at 1 Ettinger was logged at 3,582 ft. Pay showed between 3,620 ft., and total depth, 3,624 ft. Hole carried 600 ft. of free oil in 2½ hours after cement was cleaned out of 5-in. casing and hole was cleaned from 5-in. casing seat, 3,582 ft., to total depth.

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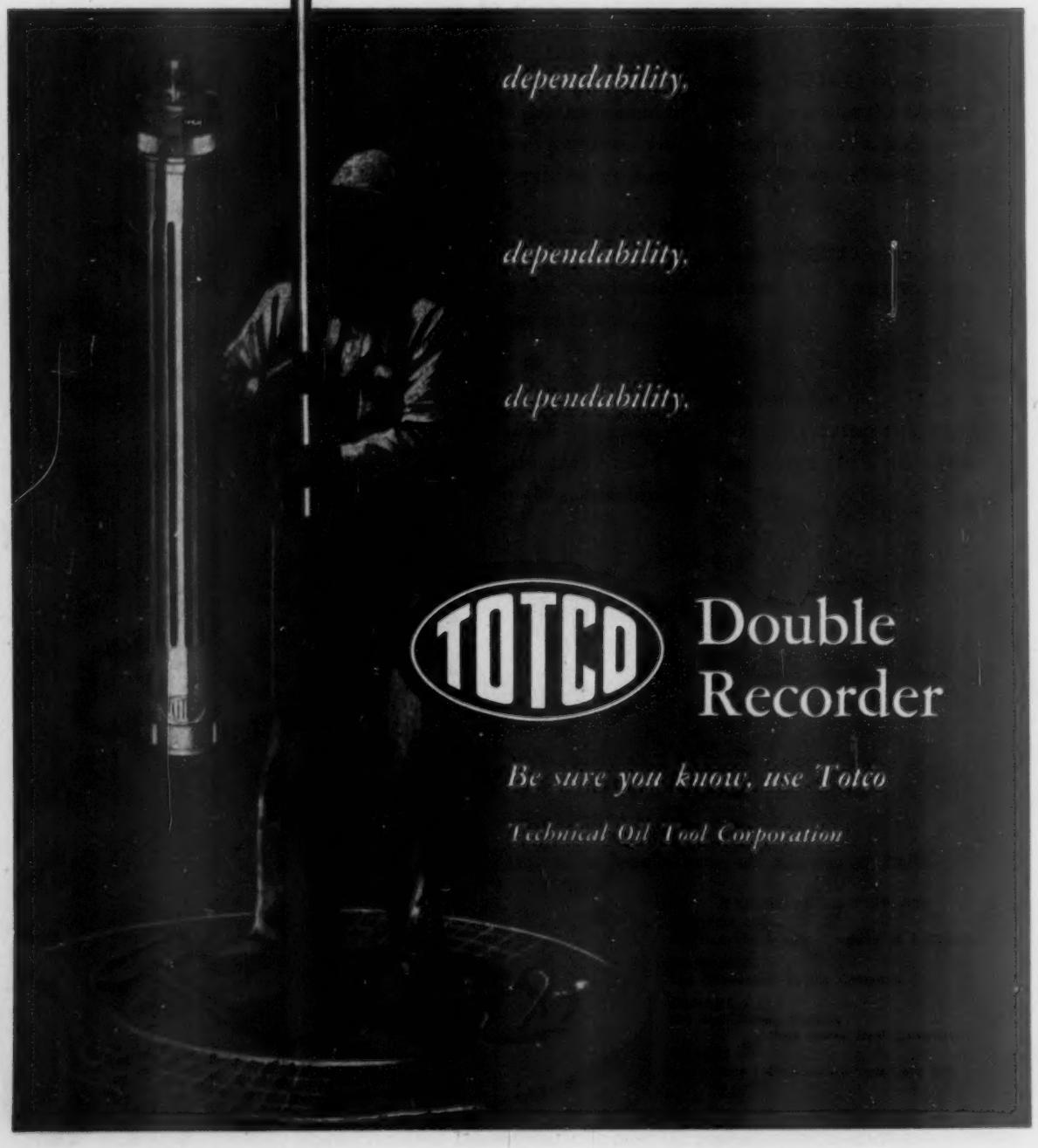


verse oil well was added in Huber field, Newaygo County, at the west 20-acre offset to discovery producer. New well, Klondike Petroleum Co., Inc. 2 Hoge, NE SW SE 5-14n-14w, Denver Township, flowed 75 bbl. of oil first 30 minutes after pay was tapped; was restricted to 7 bbl. of oil an hour for next tests; and was then pinched back to the 100-bbl. a day, per well allowable set for Huber field wells. Top of Traverse lime was logged at 2,128 ft. at 2 Hoge and oil pay was drilled in the entire section penetrated to the total depth, 2,131 ft.

● A barrier to additional southeast expansion to the pool was established by the completion of Pure Oil Co. A-1 State-Denver, NE NW NW 9-14n-14w, which was bottomed out dry 2,137 ft., total depth, where hole carried 300 ft. of salt water, no oil, in 14 hours. Traverse lime top was logged at 2,130 ft., about 2 ft. higher, structurally, than the west 20-acre which was completed as an oil well.

MID-CONTINENT

OKLAHOMA

Casing Run at New Alfalfa County Strike

Alfalfa County in northern Oklahoma has a new Mississippian discovery in prospect. The discovery well is Western Oil & Gas Co. 1 Crissup, C NE SW 7-24n-10w.

The discovery, located northeast of North McWillie-Oswego lime field, flowed 2,000-4,000 M.c.f. of gas per day on a test of the Mississippian. Recovery was 380 ft. of oil and gas-cut mud with some free oil.

KANSAS

State Activity at Peak During 1955

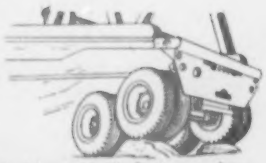
Wildcatters completed 1,018 wildcats in Kansas last year. This includes 135 oil discoveries, 34 gas, and 849 dry holes. Total exploratory footage soared to 4,053,837 ft.

Graham County led the state in new oil pools with 18. Kingman County had eight new oil pools and five gas strikes. Ellis County had six new oil fields last year.

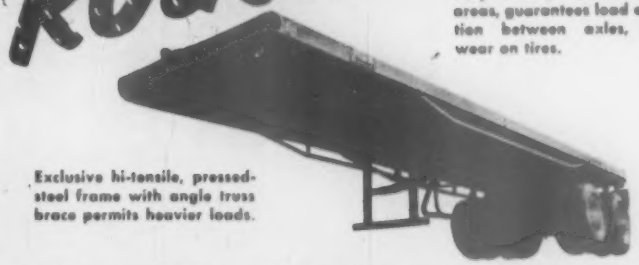
There was a marked increase in exploratory work on the northern section of the Central Kansas uplift. Other major discoveries were noted in southern Kansas and in the Hugoton embayment of western Kansas.

Some of the year's most important strikes were: First oil production in Hamilton County at United Producing

SMOOTH RIDES IN THE ROUGH



Double-pivot shaft in tandem keeps load in balance in rough areas, guarantees load equalization between axles, reduces wear on tires.



Exclusive hi-tensile, pressed-steel frame with angle truss brace permits heavier loads.

Look to Loadcraft for dependability in meeting your oil field transportation requirements. Since the first pole trailer was built 40 years ago by Fred Spencer, trailer manufacturers have attempted to duplicate Spencer quality. Pulls easier because of Spencer True-Beam Axle with machined-in camber, for correct toe-in, maximum tire life. Optional rolling tail pipe for rear loading has self-aligning roller bearings in each end. Find out for yourself that a Spencer Trailer is a quality trailer.

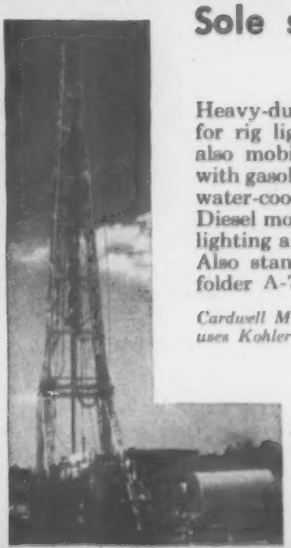
WRITE FOR LITERATURE

Choose from a complete line of Pole and Pipeline Trailers, as well as tandem or single-axle, semi-floats, or low-beds.

Spencer-Safford LOADCRAFT
AUGUSTA, KANSAS

KOHLER Electric Plants

Sole supply and stand-by models



Heavy-duty 5KW model provides reliable power for rig lights, floodlights, maintenance tools—also mobile service on portable rigs. Operates with gasoline or natural gas. Engine is 4-cylinder, water-cooled. Other sizes, 500 watts to 35KW. Diesel models, 10KW to 35KW for offshore rigs, lighting and galley equipment on quarter boats. Also stand-by models for refineries. Write for folder A-7.

Cardwell Manufacturing Company's new rig Model J-450, uses Kohler Electric Plants for auxiliary light and power.

Model 5MH22, *5KW, 115 volt AC, with housing. Manual starting.*

Kohler Co., Kohler, Wisconsin • Established 1873

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no dangerous hand-setting of slips!

BJ POWER TUBING SPIDER

Pressure-raised and pressure-set from remote foot pedal control

Completely eliminates hand-setting. Slips are pressure-raised and pressure-set by the driller or the tong man from a remote foot pedal control.

FAST... Minimizes man-effort and wasted motion ... means faster time in and out of the hole. Slips travel only a short distance. They are held in "up" position while running the stand ... have fast, positive setting action which automatically centers tubing.

VERSATILE... The BJ Power Tubing Spider can handle three sizes of tubing strings – 2⅜", 2⅞" and 3½" O.D. – with just a simple change of the unitized slip assembly. The same slips also operate efficiently on tubing strings with gas-lift valves. They work equally well with parallel strings – merely by removing fingers on right-hand and left-hand slips. Spider is readily adaptable to rotary tables for well completion, clean-out, workover and slim-hole drilling.

AVAILABLE IN TWO SIZES: Medium Weight (50-ton capacity) for depths to 10,000 feet. Working pressure – 50 psi. Heavy Weight (75-ton capacity) with extra long 9-inch slips which prevent crimping of tubing on the longest strings. Working pressure – 60 psi.

CHOICE OF POWER SOURCE... Available in air-powered or hydraulic-powered models. Can operate off the regular system of your rig ... or can be supplied with BJ auxiliary trailer-mounted air compressor or hydraulic power unit.

Power Partners to the Power Spider

The BJ air-powered Powairmatic Tong and the BJ Hydratorc Tong are natural partners to the Power Spider, using power for fast, efficient make-up and break-out of tubing and lightweight pipe.

Write for Bulletin No. BJO-679

Byron Jackson

DIVISION OF BORG-WARNER CORPORATION
P. O. Box 2493, Terminal Annex, Los Angeles 54, Calif.
Offices in Houston, Ft. Worth, Denver and New York and Sales engineers in all principal oil fields.

BJ SINCE 1872

Co. 1 Helfrich, C SE 6-25s-42w. In Kiowa County Pyle, Nichols and Wellsford pools were opened. Other significant strikes in this new Mississippian play in Kiowa County were Soldier Creek pool, Betzer, and Bergner pools.

New pools in Graham County saw extensive development during the year. Blazier and Northwest Holley pools were the county's pacesetters. Taloga pool in Norton County was one of the highlights of Southwest Kansas development. The discovery well flowed 82,000 M.c.f. of gas per day from the Morrow sand. Leslie pool in western Meade County was another important strike, making 1,074 bbl. of oil per day from the Morrow sand.

New Pool Reported In Marion County

Marion County has a new Viola pool at E. K. Carey Drilling Co. 1 Ratzlaff, C SW SE 7-19s-2e, 3 miles northeast of North Lehigh pool.

Recovery on a drill-stem test at 3,128-40 ft. was 1,100 ft. of gas, 330 ft. gassy oil and 60 ft. muddy oil. A test in the Mississippian at 2,704-25 ft. flowed 2,300 M.c.f. of gas per day.

ARK-LA-TEX

EAST TEXAS

Rusk County Wildcat Reports Woodbine Shows

Sinclair Oil & Gas Co. 1 Alsup, 3 miles southeast of Good Springs in Rusk County, found good gas shows plus some oil-cut mud on a drill-stem test of the Woodbine.

Initial test of the sand, at 3,753-77 ft., developed 884,000 cu. ft. of gas per day. Recovery at the end of 30 minutes was 15 ft. of mud with a light oil cut.

A second 30-minute test, at 3,770-85 ft., had no estimate on the gas but recovered 210 ft. of oil, 30 ft. of mud and 300 ft. of salt water. Bottom-hole flowing pressure was 350 psi. Drilling continued.

Rusk County gained another Woodbine wildcat, to be drilled by Samedan Oil Corp. 2 miles northeast of Joinerville, and 2 miles from East Texas field production. The project is 1 Jim Williams.

Smackover Wildcat Planned

Gulf Oil Corp will drill a 13,500-ft. Smackover test in the Winnsboro field of northeastern Wood County. The test will be 1 G. H. Gamblin, located on a 73-acre tract in the Benjamin Lee Survey, A-376.

An Important Step at All Eight PLS Plants That Contributes to LASTING PROTECTION For Your Steel Pipe

Unseen extra services like this make a big difference in the quality of the cleaning, priming, coating and wrapping given your steel pipe through PLS mill-applied protection. Developed and built by PLS engineers, this equipment prepares the surfaces of the pipe for primer application to assure a positive bond for the protective materials applied. Without this positive bond, coating materials cannot provide the effective, lasting protection required. Shot cleaning is far superior to other methods of cleaning used in ordinary field applications and in traveling-type operations. You get more for your money when you specify PLS *controlled protection*.

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SEISMIC GRAVITY MAGNETIC SURVEYS

WEST TEXAS-NEW MEXICO

WEST CENTRAL TEXAS

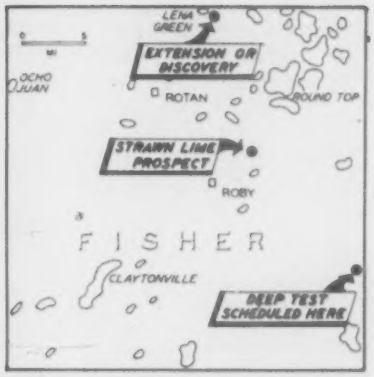
Fisher County Active With New Prospects

Fisher County reports last week had a second well assured for a new area, a wildcat showing oil and location made for a deep test.

Ray Smith Drilling Co., Dallas, cored ahead from 5,720 ft. at 1 Green & Weatherman after making good shows of oil and gas on drill-stem test of a Strawn sand section. The well is located 1⅛ miles southeast of the discovery of Lena Green, Strawn sand discovery, and may be a long extension.

Ray Smith's well topped the Strawn sand at 5,702 ft., minus 3,802 ft. A 2-hour test at 5,697-5,720 ft. had a strong blow of gas in 24 minutes, and recovered 430 ft. of heavily oil and gas-cut mud. Maximum flowing pressure was 180 psi., 30-minute shut-in pressure was 1,950 psi. Location is in Section 123, H&TC Survey, northeast of Rotan.

Reef oil northeast of Roby . . . General Crude Oil Co. 1 Bettie Waddell, wildcat 4 miles northeast of Roby in 16-3-3 Bastrop CSL Survey, were running casing for completion attempt after recovering oil on drill-stem test of a Strawn reef limestone.



Strawn sand confirmation, or new discovery, was seen at Ray Smith 1 Green & Weatherman, southeast of Lena Green pool . . . General Crude 1 Waddell, northeast of Roby, had Strawn oil . . . A 5,300-ft. rotary wildcat was located in southeastern Fisher County.

Operators topped the reef at 5,308 ft., minus 3,400 ft. Drill stem recovery after 2 hours and 40 minutes was 1,790 ft. of 38° oil, 100 ft. of mud and 30 ft. of salt water. Flowing pressure ranged from 250-450 psi., and 20-minute shut-in pressure was 2,025 psi.

An earlier test at 5,337-54 ft. also developed free oil and oil and gas-cut mud.

Wildcat location . . . A. W. and Blair Cherry have made location for a 5,300-ft. wildcat 6 miles northeast of Eskota in Fisher County. Location for their 1 Cunningham in Section 4, Block 19, T&P Survey, falls approximately ⅝ mile north of production in the Raven Creek multipay field.

West Central, North Texas Field Map Ready

Midland Map Co., Midland, Tex., now offers an oil field map covering West Central and North Texas. It is available in desk and wall size.

The wall map, 43 by 52 inches, is large enough to show all fields clearly in North Texas, where producing areas are crowded together. Scale on this map is approximately 6 miles per inch.

Data includes principal towns, pools with names and main highways. Pools are shaded to show active, gas, and old marginal fields. Area covered includes Fisher County on the west, to Grayson County on the northeastern side. It includes all of North Texas, District 9; West Central, District 7-B, and portions of West Texas Districts 8 and 7-C.

The blue line print also has a listing

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Open hole calipering is a quick and economical method of obtaining important well data prior to plugging back, setting open hole packers, or setting liners, etc. The Chemical Process Company's Open Hole Caliper has a number of operating features not available in other instruments. The tool will pass through open-end tubing (2" or larger), the motor-driven calipering arms are expanded and retracted at will which allows repeated runs without coming out of the hole, from 2" to 32" bores can be measured within ¼" accuracy, and the light weight of the tool allows accurate calipering in crooked holes. A Brown Recording Unit used with the tool plots a linear chart calibrated in ¼" increments. Recordings can be made from 10' to 100' per minute, with a vertical scale of 10', 20', 30', and 100' to the inch. Excellent correlations with radioactive and electric logs have been obtained.

If you are operating old wells on which records are not available, if you have a flood project, or if your producing wells have been shot, acidized, or fractured, there is always a possibility of hole enlargement. Talk to your nearest Chemical Process Company station about open hole surveys before you undertake any future service work. They'll be glad to explain this special service to you and advise you whether it has an application in your well program.

The Chemical Process Company

Open Hole Caliper

of all pools by Texas Railroad Commission districts, with names, producing horizons and depths.

HUGOTON EMBAYMENT

SOUTHWEST KANSAS

Morrow Oil Strike Reported in Morton

Morton County in extreme southwestern Kansas has a new Morrow oil pool at J. M. Huber et al 1 Balman, center of west line in SE NE 17-35s-43w. The operator has set casing for completion.

On a test at 4,297-4,315 ft. the well flowed gas at the rate of 310 M.c.f. daily. Then it flowed 5 bbl. of oil to pits. Recovery was 570 ft. of clean oil.

TEXAS PANHANDLE

Hansford Well Indicates Hepler Oil Production

Sharples Oil Corp. 1-B Lowe is shut in for tank space after indicating Hepler sand oil production on tests. The wildcat, located in Section 138, Block 45, H&TC Survey, 5 miles southeast of Gruver, flowed 30 bbl. of oil per day on ¾-in. choke from perforations at 6,194-96 ft. The discovery is 1 mile south of the 1 Lowe Morrow gas discovery.

SOUTHWEST TEXAS

Shallow Oil Pay Opened

A new, shallow oil area has been opened at the southeast edge of Jourdanton, in Atascosa County. Discovery is by RAR Special, of San Antonio, at its 1 Zyslecka, completed on the pump for 41.02 bbl. of 19.2°-gravity oil per day. Production is from a 1,400-ft. sand, in hole drilled to 1,567 ft.

New Gas-Distillate Well Extends Lacy Production

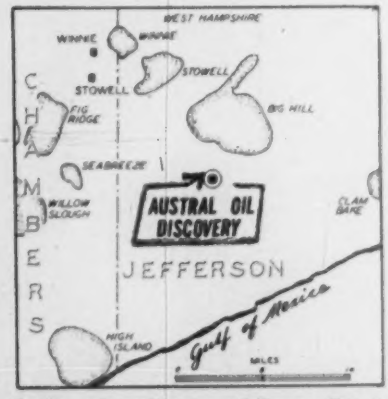
Hydrocarbon Production Co. has a new gas-condensate discovery 1¼ miles west of Lacy field, southwest of Santa Rosa, Hidalgo County. Its 1 Johnson, in Block 46, North Capisallo District, Llano Grande Grant, is rated good for 2,380,000 cu. ft. of gas daily, open-flow, with condensate recovery of 9 bbl. per 1,000,000 cu. ft. Gravity of the liquid is 53.9. Production is perforations at 7,156-60 ft. and 7,164-74 ft.

GULF COAST

Big Hill Wildcat Uncovers New Oil-Productive Area

Austral Oil Exploration Co., Inc., has a new oil-discovery well in southwestern Jefferson County. Location is about 2½ miles southwest of nearest production on the old Big Hill salt dome, scene of active, multiple-sand exploration and development the past 2 years.

The discovery well, 1-B Fowler and



Portion of southwestern Jefferson County showing location of Austral Oil Exploration Co.'s new oil-discovery well southwest of Big Hill field.

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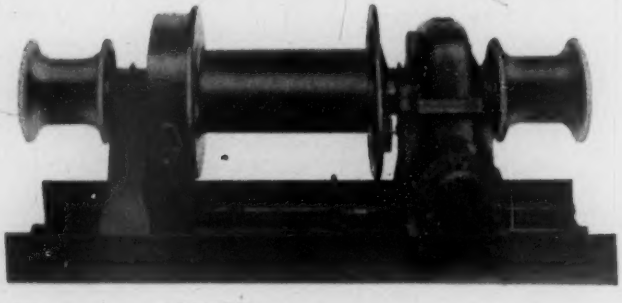
ARE STRENGTHENED AND IMPROVED TO TAKE ADVANTAGE OF THIS AVAILABLE POWER



Over 28 models to choose from with capacities from 6,000 to 100,000 pounds . . . breaking point is OVER TWICE the rated capacity. See your nearest TULSA WINCH distributor for complete details.

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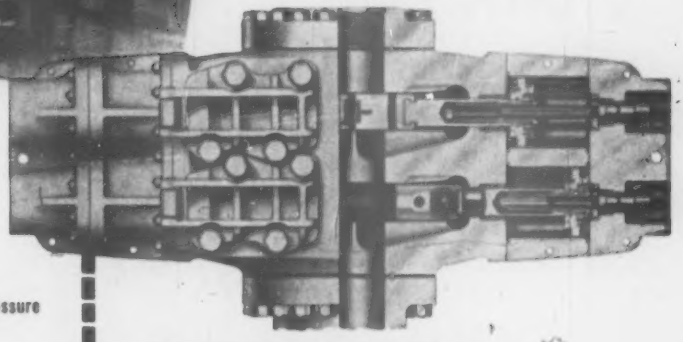
ONLY SHAFFER

Cutaway view of Shaffer Hydraulic Double Cellar Control Gate showing clean, simple design.



...and Many Other Cellar Control Gate Advantages!

Whether you prefer to call them "blowout preventers" or "cellar control gates," all pressure control equipment of this type has one common objective—to protect the well against pressure emergencies.

But there the similarity ends!

Because Shaffer Hydraulic Cellar Control Gates offer so many other far-reaching advantages—*in addition to unsurpassed pressure protection*—they have become the top choice among leading operators throughout the industry. For example, check simplicity of changing rams . . .

In Shaffer Hydraulic Cellar Control Gates there's no need to expand the gates endwise to permit changing the rams.

Nor is there need to allow extra space above the gate to permit lifting the rams out.

Nor on Double Gates is it necessary to dismantle the upper compartment to change rams in the lower compartment—or vice versa.

Each ram compartment has a convenient side-opening door. To change rams, simply unbolt and swing open the door—change rams—then close and bolt the door. Closing the door automatically aligns the rams within the gate. It's as simple as that!

And since each compartment of a Double Gate has its own set of doors, rams in either compartment can be changed with equal speed and simplicity.

But easy ram changes is only one of many extra advantages you get in Shaffer Hydraulic Control Gates. Other features are outlined at right. Before you buy *any* cellar control gates, why not get the complete Shaffer story from your nearest Shaffer representative? Or write direct!

Send for your free copy of the latest Shaffer Catalog.

Other Unique Shaffer Features

Compactness—All three dimensions—length, width, height—are unusually compact. For example, even in sizes as large as $13\frac{3}{8}$" (12" Series 900), *total* height is only 30". No extra space is required above the gate for changing rams.

Choice of Designs—Shaffer provides a choice of *Single* or *Double* Gates . . . and a choice of *Rising* or *Non-Rising* Locking Shafts . . . in all sizes. Select the particular design *you* prefer for *your* requirements.

Trouble-Free Simplicity—Throughout, Shaffer Hydraulic Gates are designed for freedom from maintenance and operating problems. Rams travel on guide ribs high above the steeply-sloped, self-draining compartment bottoms. No detrimental mud or sand accumulations can interfere with free ram travel. Shaffer Hydraulic Gates are completely enclosed—no exposed moving parts to become damaged or corroded. Hydraulic cylinders are *directly behind* the rams for positive drive (there are no yokes or complicated secondary connections).

These and other advantages make Shaffer Hydraulic Gates top choice for maximum value in pressure protection!

See the Shaffer section of your Composite Catalog.

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others, is productive from casing-perforated interval at 10,199-10,208 ft. A preliminary drill-stem test, open 45 minutes through ¼-in. chokes and using 5,000 ft. of water cushion, recovered 3,240 ft. of 30°-gravity oil. Bottom-hole flowing pressures gaged 5,310 psi., initial, and 6,955 psi., final. Shut-in pressure was 7,245 psi.

Hole was drilled to 10,510 ft. and oil string cemented on bottom. Tide Water Associated Oil Co. and Hudson Gas & Oil Corp. are associated with Austral in the operation.

Old Dry Hole Completed As Orange Discovery Well

MPS Production Co.'s new discovery-well, 4½ miles northeast of Vidor, in Orange County, produced at the rate of 56.82 bbl. of 41.6°-gravity oil per day during its potential test, made through ⅛-in. choke. Production is from Hackberry sand, perforated at 8,084-87 ft. and 8,093-96 ft. Flow was under pressure of 2,070 psi. with gas-oil ratio of 8,485 cu. ft. per barrel.

The well, 1 Shannon, is in a hole abandoned last August by Edwin L. Cox after being drilled to 8,630 ft. Location is 3 miles south of Doty field, nearest production.

no matter what the installation . . .

VIBRA-PAK ANODES ARE BEST!

Proved on every type of installation — under every soil condition — Vibra-Pak anodes get the job done better because:

1. SPECTROGRAPHICALLY ANALYZED
Guarantees exact specifications.

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Perfectly bonded — assures maximum efficiency.

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Provides even distribution for added anode life.

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P. O. BOX 1424J • TULSA, OKLAHOMA

SOUTH LOUISIANA

Darrow Discovery Uncovers Deep Condensate Reservoir

Another important gas-condensate reservoir appears to have been opened at the old Darrow salt dome, in Ascension Parish.

Its discovery is by Monterey Oil Co. at its 1 Falcon, in 20-10s-2e, on the northwest flank of the dome. Interested with Monterey in the project is Kern County Land Co., which holds 2,000 net acres in a block of 3,300 acres.

The reservoir, in Miocene sand, is perforated at 10,956-82 ft. The discovery well's flow on tests through ¾-in. choke was at the rate of 2,820,000 cu. ft. of gas and 56 bbl. of condensate per day with pressure of 4,000 psi.

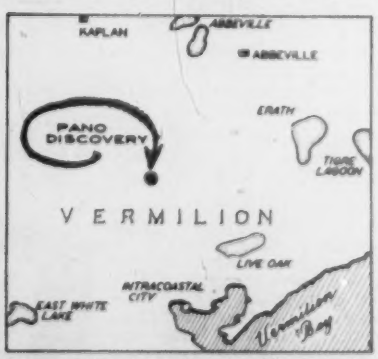
New Gas-Condensate Field Found in Vermilion Parish

Pano Tech Exploration Co. is adding another to the succession of new deep fields which have opened in southern Vermilion Parish within the past year.

Its discovery is about 4 miles northwest of the spreading Live Oak field where its 1 Theall, in 2-14s-2e, is being completed as a gas-condensate producer from a Miocene sand perforated at 11,580-93 ft.

Testing continues through various chokes. Through ¾-in. choke, flow was estimated at 3,250,000 cu. ft. of gas per day, spraying condensate. Through ¼-in. choke, it was at an estimated rate of 2,250,000 cu. ft. per day. Flowing pressure was from 4,100 to 4,150 psi. Pressure, shut-in, is 4,200 psi.

Location is on a 2,500-acre block farmed out from Ohio Oil Co. Original



Arrow indicated location of Pano Tech Exploration Co.'s new gas-condensate discovery well in southern Vermilion Parish.

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"TANKS FOR THE WORLD"
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COLUMBIAN BOLTED STEEL OIL STORAGE and the Columbian trade mark are known...wherever oil is produced and stored...for Columbian truly makes "TANKS FOR THE WORLD". This international acceptance of Columbian quality is the result of Columbian's 62 years of experience in steel fabrication by master craftsmen who retain an old-fashioned pride in fine workmanship. Aided by the most modern machinery, they maintain craft quality in every one of the thousands of strong, precisely formed plates that go into Columbian's production of "Tanks for the World."

Columbian Steel Buildings for pump houses, warehouses, garages, offices and field installations are also known all over the world for their ease of erection, strength and low maintenance cost. Write for complete illustrated catalog.

COLUMBIAN Steel Tank Co., P. O. Box 4048-J, Kansas City, Mo.

STEEL, Master-Crafted by Columbian... First for Lasting Strength

plans called for drilling to about 14,000 ft., but hole was bottomed at 11,775 ft. after encountering the above sand.

EASTERN INTERIOR

ILLINOIS

Edwards County has an important O'Hara lime discovery at Calvert Drilling Co.-Barnsdall Industries 1 W. C. Deischer, NE NE SW 29-1n-10e, 7 miles northwest of Albion.

The well is pumping and flowing 406 bbl. of oil per day from 3,273-82 ft., after acid. Nearest O'Hara production is 2 miles.

KENTUCKY

Deepest Basin Test Completed in Kentucky

Shell Oil Co.'s wildcat oil well, 1 Mildred Davis, in Crittenden County, Kentucky, was abandoned today after penetrating to 8,821 ft. and repeated surveys a d tests gave no indication of commercial amounts of oil and gas.

The well was the deepest test made to date in the Illinois basin. Drilling operations have been continuous for nearly 150 days. During the drilling operations, Shell used many different surveys to test every possibility. Among the surveys were the standard electric logs, micro laterlogs, gamma ray logs and neutron logs.

A special fracture treatment test was made on the Chattanooga shale in the interval of 1,380 to 1,400 ft. where there was a small gas show. The test produced such a small amount of gas that it was not measurable and proved to be completely noncommercial.

"The failure of this wildcat was not completely unexpected," C. P. Bristol, Shell vice president, said, "for only one in nine wildcats find oil. The odds are definitely against discovering oil with the first well in a new region. National averages show that only 1 wildcat in 44 finds oil in commercial quantities, and only 1 in nearly 1,000 discovers oil in sufficient volume to supply the nation for 1 week or more."

New Publication

The Kentucky Geological Survey in Lexington has issued Special Publication No. 8, a symposium of papers delivered at the technical session of the Kentucky Oil & Gas Association meeting in Lexington May 26-27, 1955. These sessions dealing with petroleum geology and engineering are becoming an increasingly important part of its meetings. The papers are being published to make this information available to operators in the state and elsewhere.

Papers included in the proceedings are: "Geology of Comer field, McLean County, Kentucky," by E. J. Combs; "Oil Development in Indiana during 1954," by T. A. Dawson; "Discussion of Core Analysis," by John R. Lavens, Jr.; "Fracturing of Oil Bearing Strata in Proximity to Aquifers," by Arthur Stegelman, Jr.; "Oil and Gas Developments in Kentucky in 1954," by Frank H. Walker; "A Hill Billy Becomes a Public Utility," by Raymond M. Myers; "The Use of Radioactive-Tracer Surveys in Water-Injection Wells," by James M. Bird and John C. Dempsey; "Isoflow Logging—A Method of Water Injectivity Profiling," by George K. Harcourt; "Vertical Fracturing," by Lloyd C. Taylor; "Waterflood Developments in West Virginia," by A. W. Headlee and Thomas Arkle, Jr.; and, "What is Meant by Permanent Type Well Completion," by W. W. Wylie.

DAY IN

LARKIN LEADERSHIP HAS BEEN EARNED

ROCKY MOUNTAIN

WYOMING

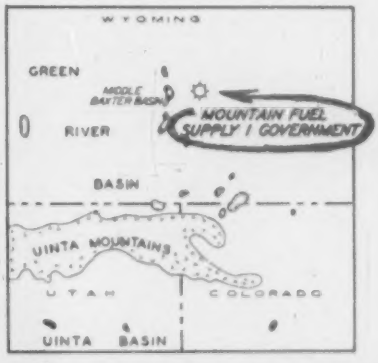
Sweetwater County Discovery Completed

Mountain Fuel Supply Co. has completed its shallow Mesaverde discovery in the Chimney Rock area of Sweetwater County. The well, 1 Government, E½ SE SW 12-18n-102w, flowed 3,690,000 cu. ft. of gas per day on test at 895-919 ft. in the Rock Springs member of Mesaverde. The discovery is east of Baxter Basin field. The area has had little previous exploration.

New Green River Basin Exploration Planned

Carter Oil Co. has made location for two wildcats in Sweetwater County and Stanolind Oil & Gas Co. has unitized a block in the same county in preparation for the expected increase in Green River basin activity.

Carter will drill a 4,000-ft. test of Frontier at 1 Twin Creek Unit, C SW SW 29-21n-103w, on the west flank of the Rock Springs uplift. The wildcat is 8 miles north of Baxter Basin. Carter also has location for 1 Government, C NW NW 17-26n-94w. It is a scheduled test of Mesaverde to about 6,500 ft.



Mountain Fuel Supply Co. 1 Government, Chimney Rock area Mesaverde gas discovery, flowed at the rate of 3,690 M.c.f. per day. Location is E½ SE SW 12-18n-102w, Sweetwater County.

Stanolind has completed unitization of the Tepee Mountain block in the southern portion of Sweetwater County. The block is in 12n-104w and 105w, and contains 9,500 acres. It is 10 miles west of Stanolind's Middle Mountain unit which produces from Mesaverde, and immediately north of the Clay basin unit, which has production in the Colorado portion of the unit.

MONTANA

Pine Unit Silurian Test Successful

Shell Oil Co. reported a flow of oil at the rate of 133 bbl. per hour on test of Silurian at a well in the southern portion of the Pine Unit, Wibaux County. The well is not the first to indicate commercial possibilities from the formation. The rate of recovery is, however, far the most encouraging from this formation to date.

Test at Shell's 43-23-A Unit, C NE SE 23-11n-57e, was of the interval 8,453-8,519 ft. Tool was open for 50 minutes, with oil flowing for 20 minutes of that time at the rate of 133 bbl. of oil and 2 bbl. of sediment and water per hour. Flowing pressure was 1,320 psi. at the beginning of the test, increased to 3,245 psi. by the time the tool was closed.

Shell is drilling below 8,768 ft. at the well and will apparently test Ordovician before completion.

Previous completions in this field, as

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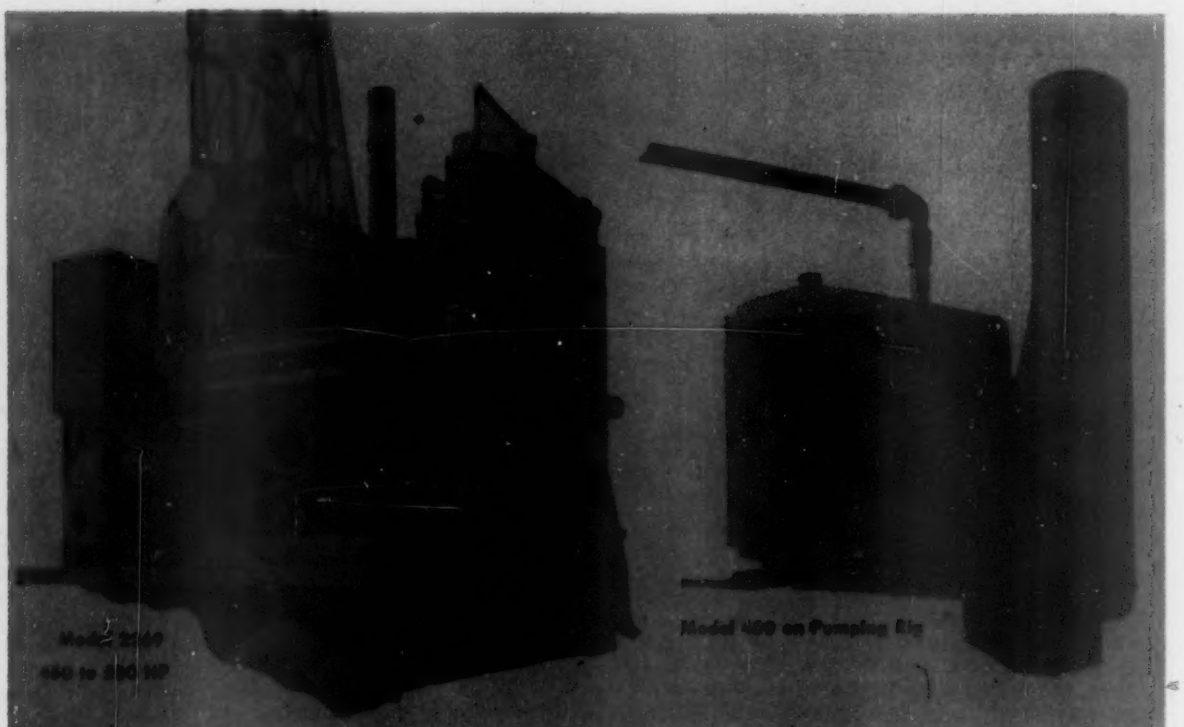

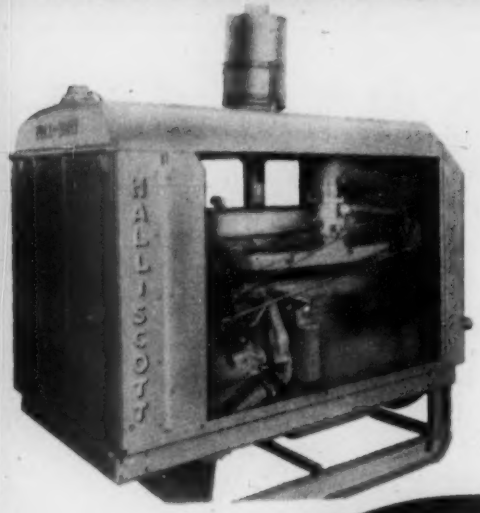

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TALLAHASSEE, FLORIDA—Wright Motor Co.
WICHITA FALLS, TEXAS—Harlow Sampson, Inc.

well as in Cabin Creek, have been in Red River (Ordovician). Apparently commercial shows in both Madison and Silurian have been drill-stem tested in previous drilling, but completions have not been attempted in either of these formations.

Silurian recovery at the rate of that in the present well offers important reserve considerations in fields of the Cedar Creek anticline. Silurian is erratic in occurrence along the anticline, and is present in various section thicknesses. In previous drilling it has generally shown excellent porosity and permeability, but in many cases has carried water.

Confirmation Completed At Wolf Springs

Atlantic Refining Co. has completed its second well in the Wolf Springs area of Yellowstone County. The well, 2 Horton estate, C SE NW 18-7n-32e, flowed 224 bbl. of oil per day on 12/64-in. choke. Production is from Amsden dolomite at 6,085-6,120 ft. Formation was not acidized before completion.

COLORADO

Pipe Set at Weld County Discovery

H. C. Arnold, Utah Southern Oil Co. and Arrowhead Exploration Co. reported a flow of oil after 45 minutes of a drill-stem test of J sand at 2 UPRR-McEndaffer, NE NE NE 31-12n-56w, Weld County. Test at 6,350-87 ft. was shut in over night, and reversed out 6,240 ft. of oil with 100 ft. of water before pipe was pulled. The operators have set pipe, and are preparing for final tests. The well is 4 miles northwest of production in South Long field.

H. C. Arnold, Utah Southern, and Arrowhead Exploration Co. 2 UPRR-McEndaffer, NE NE NE 31-12n-56w, is a new "J" sand oil discovery in the extreme northeast corner of Weld County. This section of the county has had little previous wildcatting.

NORTH DAKOTA

Burke, Ward County Discoveries Tested

Early and inconclusive tests of apparent discoveries in Burke and Ward counties have proved disappointing. Calvert Drilling Co. recovered salt water on initial swabbing at 1 O'Clair, NW NW 15-160n-87w. Test was of perforations at 5,810-16 ft. Oil was recovered on drill-stem test at 5,788-5,820 ft. Tests will continue.

In Burke County, Texota Oil swabbed 47 per cent oil at the end of 5 hours, and 25 per cent oil after 7 hours at 1 Swenson, NE SW 22-163n-93w. Test is of Mississippian at 6,220-50 ft. Drill-stem test recoveries from this general interval included very little water. Tests will also be continued at this well which is 27 miles north of Tioga field.

WESTERN CANADA

SASKATCHEWAN

Charles Discovery Hinted At Hirsch Area Wildcat

Another wildcat driller in southeast Saskatchewan, operated by Imperial Oil, Ltd., and being drilled on farmout acreage from the Canadian Superior Oil of California, Ltd., has encountered a showing of light oil in the base of the Charles zone of Mississippian formation.

The discovery well, Imperial-Canadian Superior 13-26 Hirsch, on LSD 13, 26-3-5w2, is 4½ miles north of Hirsch town and 5 miles west of oil production in the Frobisher area.

During a drill-stem test of the interval 4,828-43 ft., 600 ft. of clean oil along with 200 ft. of oil-cut mud and 50 ft. of salt water was encountered.

Crew on this well has since drilled ahead into the Misison Canyon sector of the same formation and is currently carrying out further drill-stem test operations.

● A recent entry into the search for oil and gas in western Canada, Alida Oil Co., has apparently indicated oil production at its first venture which was drilled in the Glen Ewen area of southeast Saskatchewan, 7 miles southwest of the town of Oxbow and 17 miles southeast of oil producers in Frobisher oilfield. It was learned from unofficial sources that the well had encountered showings of oil in both the Charles and Mission Canyon sectors of the Mississippian formation, and had subsequently been cased for production tests.

This well, Alida 1 Glen Ewen was

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drilled on LSD 5, 28-2-1w2, was carried to a total depth of 4,589 ft., production casing was set to that depth and crew was released from the rig, according to the unofficial reports. The well was reported standing at total depth at last report.

ALBERTA

Imperial Will Try Completion at Carbon Well

Imperial Oil, Ltd., has had encouraging oil showings in two separate zones of the Devonian formation at its current driller in the Carbon area of central Alberta and has set production casing through the zone in attempt to complete it as a commercial producer. Light gravity oil shows, estimated at 36° were encountered on drill-stem tests run in the D2 and D3 zones of Devonian.

The well, Imperial 11-19 Carbon, on LSD 11, 19-29-23w4, is 3 miles northwest of Carbon town and 44 miles northeast of Calgary's city limits. The closest previous well, Anglo Union-Kroy 13-9 Carbon which was abandoned, lies 1¾ miles southwest.

Initial test in the D2 zone, of the interval 6,237-44 ft. gave up 370 ft. of light gravity oil and 30 ft. of sulfurous salt water while the next test, bottomed at 6,259 ft. showed 165 ft. oil-cut sulfurous mud, 90 ft. of clean gassy oil and 210 ft. of muddy oil-cut sulfurous salt water. The only other test run in that horizon, bottomed at 6,279 ft. gave a pipe recovery of 30 ft. of mud and 270 ft. of black sulfurous salt water.

The D3 zone was initially tested of the interval 6,364-88 ft. When pipe was pulled it was found to contain 135 ft. of gassy, oil-cut mud and 270 ft. of gassy oil. The next test, 10 ft. immediately below the first interval gave up 480 ft. of black sulfurous salt water. It was estimated that either zone had less than 10 ft. of oil pay section, so extensive production test operations will have to be carried out to fully evaluate the showings.

Flat Lake Area Strike Capped as Potential Gas Well

A well in the Flat Lake area of north central Alberta which was reported last week as having found gas in the top of the Blairmore formation, drilled by the Union Oil Co. of California, has indicated gas from another two zones and has been capped as a potential gas producer. After recording gas flows up to 2,000,000 cu. ft. daily in the top portion of the Blairmore the crew drilled ahead and indicated a gas flow of 1,669,000 cu. ft. per day from the basal Blairmore. The D1 zone of Devonian was next to indicate a gas zone. Drill-stem operations were carried out and gas flows up to 2,300,000 cu. ft. daily were encountered.

The well, Union 11-3 Flat Lake, on LSD 11, 3-66-20w4, is 5 miles southeast of Shell Oil Co.'s 1 Flat Lake abandonment and 9¾ miles north and slightly east of Stanolind's 1 Ellscott unsuccessful exploratory venture.

This triple zone discovery hole was carried to a total depth of 2,450 ft. and 7-in. production casing was run to a depth of 2,016 ft. The rig was then released and the well was capped.

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ALBERTA

Imperial 11-19 Carbon, LSD 11, 19-29-23w4, TD 6,338 ft. indicated oil well.

Cal-Standard 4-25 Cynthia NE, LSD 4, 25-30-12w5, TD 7,010 ft. indicated Cardium oil well.

Union 11-3 Flat Lake, LSD 11, 3-66-20w4, TD 2,450 ft. capped gas well.

ARKANSAS

Ouachita County: P. J. Spears et al C-3 Reynolds, 27-15s-15w, IPF 86 BOPD, Travis

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Peak 2,911-14 ft., 35.2°, 10/64-in. choke. TD 2,926 ft. (New Travis Peak area in Smackover field).

Union County: Samuel S. Alexander et al 1 Olin, 1 mile east of Nick Springs field in C SW SE SE 32-17s-14w, ½ mile south of Nick Springs town. IPP 62 BOPD, Cotton Valley 4,911-20 ft. 39°. TD 4,927½ ft. (Discovery of East Nick Springs field).

ILLINOIS

Lawrence County: NAPCO 1 Carter, NE NE NE 10-4n-11w. IPP 17 BOPD, McClosky lime 1,638-43 ft. TD 1,644 ft. (Opens East Pinkstaff pool).

Washington County: G. Zicos 1 Dalman, SE SE NE 27-3s-2w. IPP 47 BOPD, Benoist sand 1,253-55 ft. TD 1,266 ft. (Opens South Posen pool).

KANSAS

Barton County: CRA 1 Gagleman, SE SE NE 29-19s-15w. IPP 25 BOPD, Arbuckle 3,639-45 ft., 2,000 M.c.f. of gas per day. TD 3,645 ft. (Opens Northeast Bahrens pool).

Graham County: El Dorado Refining Co. 1 Keith, NE NE SE 29-8s-24w. IPP 310 BOPD, Lansing lime 8,897-3,906 ft., 40°. TD 3,947 ft. (Opens North Holly pool).

Kingman County: Pickrell Drilling Co. 1 Bertholf, SE SE NE 3-30s-8w. IP 11,000 M.c.f. of gas per day, est. Mississippian 4,201-10 ft. TD 4,732 ft. (Opens Bertholf pool.)

WYOMING

Sweetwater County: Mountain Fuel Supply 1 Government, C½ SE SW 12-18n-102w. IP 3,690 M.c.f. of gas per day, Mesaverde gas discovery, new field. TD 6,746 ft. Nugget.

MISSISSIPPI

Adams County: John S. Callon 1 George-Foules Unit 1, 24-5n-2w. IPP 88 BOPD (net), 6 per cent b.s. and w., 38°, perforations 6,513-15 ft. (Wilcox). TD 6,805 ft. (New field—South Kingston.)

Hancock County: Marshall Young 1 Cuevas heirs, 30-9s-15w. IP 222 BOPD and 1,700 M.c.f. daily, 7/32-in., 41.8°, perforations 10,839½-51½ ft. (Washita Fredericksburg). TD 10,914 ft. (New field—Ansley.)

SOUTH LOUISIANA

Terrebonne Parish: Forest Oil Corp. 1 Nelson, 36-20s-12e. IP 114 BOPD and 2,720 M.c.f. daily, ¼-in., 55.5°, perforations 10,266-72 ft. TD 14,580 ft. (New field—Mosquito Bay area.)

Plaquemines Parish: Continental Oil Co. (operator for CATCO group) 2-B State Lease 984, Block 59, West Delta area, Gulf of Mexico. IP 302 BOPD and 1,010 M.c.f. daily, 5/32-in., 31.5°, perforations 13,000-04 ft., and (dual completion) 151 BOPD and 1,722 M.c.f. daily, ⅛-in., 44.2°, perforations 12,874-12,972 ft. TD 13,115 ft. (New pays in West Delta Block 59 field.)

SOUTHWEST TEXAS

Dimmit County: Antler Drilling Co. 1 Votaw, Section 11, T&NO Sur., Block 3 (in Carrizo Springs townsite). IP 7,800 M.c.f. daily, open-flow potential, dry gas, perforations 2,869-75 ft. (Olmos sand). TD 3,015 ft. (New pay in Wintergarden field.)

SOUTHEAST NEW MEXICO

Chaves County: Intex Oil Co. and J. H. Trigg 1-26 Federal, 26-12s-26e. IPP 47 BOPD, San Andres 1,338 ft. TD 6,811 ft.

Lea County: Delhi-Taylor Oil Co. 1 Federal-Cline, 14-23s-37e. IP 137 BOPD, ¼-in., TP 60 psi., GOR 320, 39.6°, Devonian 7,963-8,028 ft. TD 10,325 ft., elev. 3,283 ft.

EAST TEXAS

Cherokee County: Union Producing Co. 1 Graham, Thomas Quevedo Sur., A-44, 5 miles NE Jacksonville. Rodessa perforations 8,501-09 ft., IP 2,210 M.c.f. gas, ¼-in., TP 1,500 psi., shut-in TP 3,550 psi., Pettet perforations 9,196-9,208 ft., IP 2,350 M.c.f. ¼-in., TP 1,600 psi. TD 9,714 ft., elev. 532 ft. New-field name, Lover's Lookout.

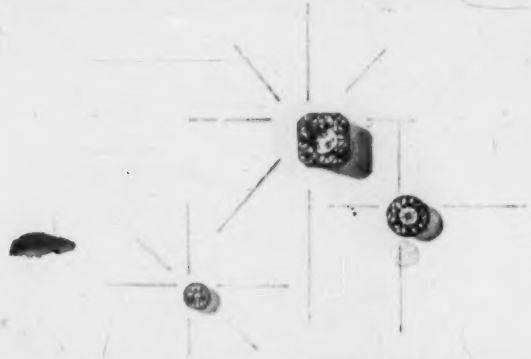
NORTH TEXAS

Archer County: Norman & Johnson and R. F. Duggan 1-A Powell, Blk. 149, John Harris Subd., H. A. Allen Sur., A-3, 2 miles NE Archer City. IPP 85 BOPD, 39°, GOR 400, Strawn 3,764-67 ft. TD 3,830 ft.

Grayson County: Standard Oil Co. of Texas 2 Ray Crow, Blk. 4, University Lge. Sur., 4 miles NW Sherman. IP 199 BOPD, 14/64-in., TP 775 psi., GOR 726, 32.5°, Simpson 9,599-9,617 ft. TD 12,125 ft. New-pay discovery, NW Sherman field.

Star Oil Co. and Monsanto Chemical Co. 1 Miller, G. M. Dial Sur., A-365, 2 miles E Southmayd, IP 920 BOPD, 9/64-in., TP 1,200 psi., 40°, GOR 970, Oil Creek 8,900-8,906 ft. TD 9,018 ft. Ground elev. 759 ft.

Montague County: Bolin Oil Co. 2 McCall-Fooshee, R. R. Brown Sur., A-40, 4 miles N Montague. IPP 47 BOPD, 38°, GOR 170, pay 4,654-59 ft. TD 4,760 ft. LaGorce Oil Co., P-M Drilling Co. and C. L. Morgan 1 Sea Estate, J. Newton



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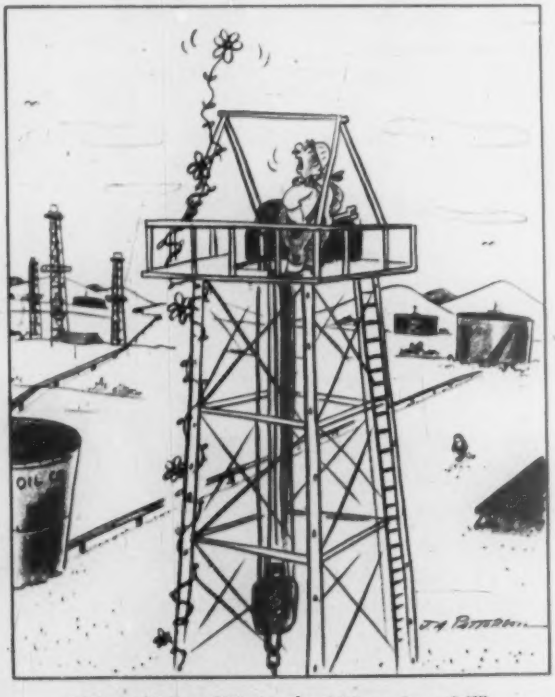
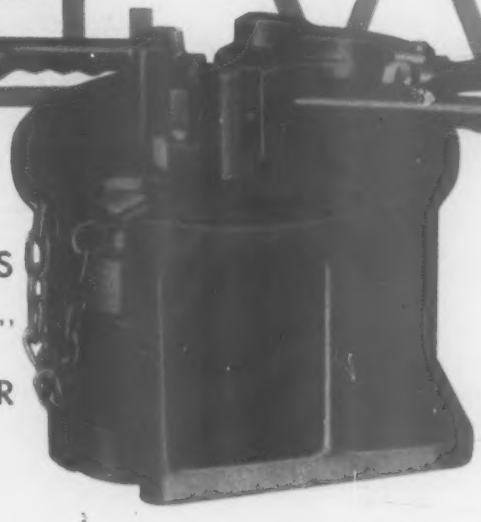


"Where th' Sam Hill do you think you're goin'?"

NEW



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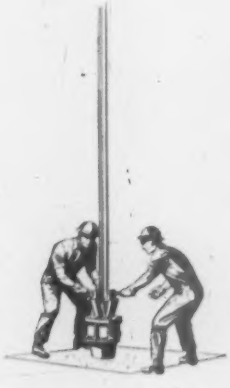

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Sur., A-570, 6 miles W Decatur. IP 288 BOPD, 16/64-in., TP 425 psi., 35°, GOR 550, Caddo 5,680-82 ft. TD 5,863 ft.

Wilbarger County: John E. Kirkpatrick 1 Wall, Sec. 2, GC&SF Sur., A-1948, 14 miles NW Vernon. IP 167 BOPD, 24/64-in., TP 230 psi., GOR 250, 41.5°, conglomerate 5,848-57 ft. TD 5,910 ft.

Young County: Arnold H. Bruner 1 Bagley, Phillips Averitt Sur., A-2, 5 miles N Loving. IP 604 BOPD, 16/64-in., TP 220 psi., GOR 400, Strawn sand 3,204-14 ft. TD 3,856 ft. New pay in Garvey field.

Wesley Stephens et al 1 Stoffers, J. A. Driver Sur., A-2073, 10 miles S Graham. IP 85 BOPD, 10/64-in., TP 350 psi., GOR 750, 41°, sand 2,598 ft. TD 2,615 ft.

TEXAS GULF COAST

Bee County: Fitzpatrick Drilling Co. 3 Welder, Spencer Morris Sur., A-421. IP 22,000 M.c.f. daily, open-flow potential, dry gas, perforations 4,341-45 ft. and (dual completion) 17,000 M.c.f. daily, open-flow potential, dry gas, perforations 2,678-86 ft. TD 4,403 ft. (New pay in Poesta Creek field).

John B. Hawley, Jr., 2 Boothe, B. C. O'Neal Sur., A-560. IP 2,070 M.c.f. daily, open-flow potential, GCR 200 M.c.f. per bbl., 55.5°, perforations 3,580-90 (upper Pettus). TD 4,006 ft. (New pay in West Cosden field).

Chambers County: The Texas Co. 2 Kirby, T&NO Sur., A-503 (north flank Barbers Hill dome). IP 6,100 M.c.f. daily, open-flow potential, GOR 37.1 M.c.f. per bbl., 48.8°, perforations 11,127-50 ft. (Yegua). TD 12,585 ft. (New pay in Barbers Hill field).

Colorado County: Christee, Mitchell & Mitchell 3 McDermott Unit, Johnson & Stafford Sur., A-720. IP 11,500 M.c.f. daily, open-flow potential, perforations 6,359-78 ft. (Yegua). TD 6,500 ft. (New pay in South Nada field).

Skelly Oil Co. 1-A Killman, Thomas Matthews Sur., A-413. IP 6,200 M.c.f. daily, estimated open flow-potential, perforations 9,683-9,700 ft. TD 10,800 ft. (New reservoir in Columbus area).

Galveston County: Humble Oil & Refining Co. 69-A State, Section 137, Galveston Bay. IP 28,000 M.c.f. daily, open-flow potential, dry gas, perforations 3,390-3,400 ft. TD 11,835 ft. (New pay and extension Red Fish Reef field).

Goliad County: A. B. Alkek 1 Swickheimer et la, Juan Rener Sur., A-34, IP 69 BOPD, 9/64-in., 26.5°, peforations 3,657-60 ft. TD 4,756 ft. (New field).

Kleberg County: Standard Oil Co. of Texas 947-58 State, Tract 947, Gulf of Mexico. IP 1,206 M.c.f. daily and 15 BCPD, 3/16-in., perforations 7,720-35 ft. TD 10,700 ft. (New pay in Chevron field).

Karnes County: Dunlap Oil Corp. 1 Wolters et al, R. Stiz Sur., A-4.0, and V. Blanco Sur., A-3. IP 44.32 BOPD, 5/64-in., 46.1°, perforations 3,973½-77½ ft. TD 4,050 ft. (New field).

Live Oak County: W. G. Darsey, Jr., and Pyramid Drilling Co. 1 Reynolds, G. W. Sharp Sur., A-417. IP 69.19 BOPD, 3/16-in., 24.5°, perforations 4,860-66 ft. TD 4,930 ft. (New field).

Montgomery County: Slick Oil Co., Ltd., 1 Glass et al, William Barker Sur., A-82. IP 5,000 M.c.f. daily, open-flow potentian, GCR 17,308 cu. ft. per bbl., 59°, perforations 7,070-85 ft., and (dual completion) 9,200 M.c.f. daily, open-flow potential, GCR 57,218 cu. ft. per bbl., 56.1°, perforations 7,202-06 ft. TD 7,514 ft. Gas-condensate discovery in Splendora area).

Newton County: Kilroy Oil Co. of Texas, Inc., 1 Quinn, W. F. Sheppard Sur., A-1189. Shut-in gas-condensate well, no gage, perforations 7,972-76 ft. TD 9,505 ft. (New field).

WEST CENTRAL TEXAS

Callahan County: McCarrick-Gougher-Mitchell 5 Dyer heirs, W. G. Riley Sur., 4½ miles NW Clyde. IPP 12 BOPD, 41.6°, GOR 387, Flippen 1,650-54 ft. TD 1,658 ft.

Stonewall County: Chapman & McFarlin Production Co. 1-A Pumphrey, Peter DeLane Sur., A-67, 6 miles E Aspermont. IP 177 BOPD, 20/64-in., TP 180 psi., GOR 530, 40°, conglomerate pay 6,054 ft. TD 6,071 ft.

Taylor County: Miami Operating Co. 1 Shaffer, J. M. Anderson Sur. 4, 2 miles NW Moro. IP 576 BOPD, 32/64-in., TP 320 psi., 40°, GOR 210, Cross Cut sand 4,337-46 ft. TD 5,111 ft.

WEST TEXAS

Gaines County: Husky Oil Co. and Sinclair Oil & Gas Co. 1 Jines, 16-C35-PSL Sur., 6 miles W Seagraves. IP 459 BOPD, 13/64-in., TP 700 psi., GOR 11, 36.3°, top Devonian 12,997 ft., pay 12,997 ft., perforated 13,022-55 ft., TD 13,070 ft., elev. 3,438 ft.

J. C. Williamson 1 Crews-Mast, 10-A20-PSL, 12 miles S Seminole. IP 240 BOPD, 20/64-in., TP 400 psi., GOR 600, 33°, Queen sand 4,341-51 ft. TD 4,380 ft.

Howard County: D. W. Varel 1-J Bates, 13-33-T1N-T&P, 8 miles NW Big Spring. IPP 108 BOPD, 29.7°, GOR 165, pay 3,185-3,201 ft. TD 3,288 ft.

Midland County, new-pay opener in Ruth Scharbauer field: Gulf Oil Corp. 1-C Scharbauer Cattle Co., 10-39-T1S-T&P, 6 miles N Midland. IPP 6 BOPD, 35°, pay 8,970-9,050 ft. TD 12,899 ft.

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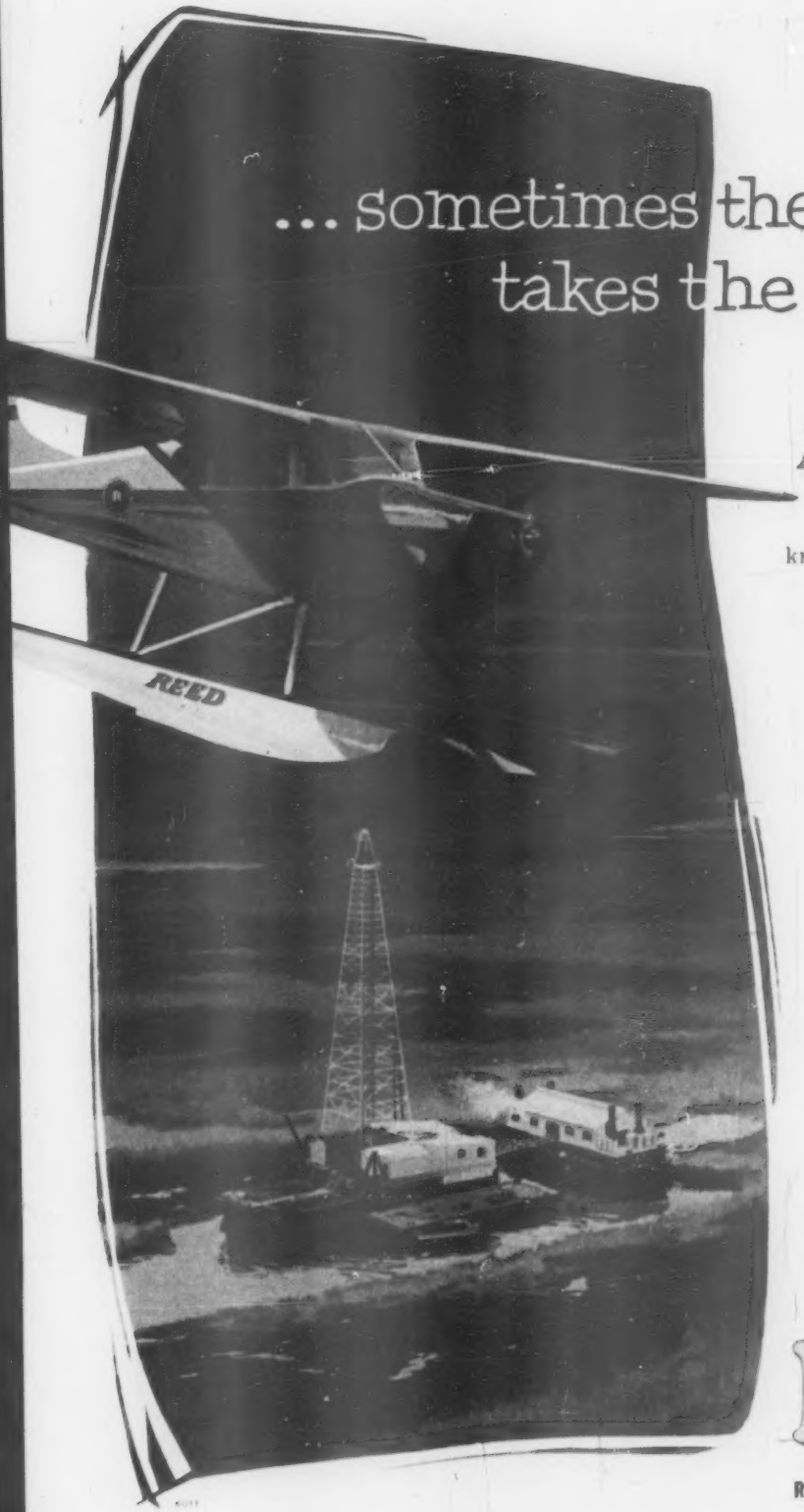


... sometimes the Reed Man takes the high road!

A familiar sight in the marshlands of Louisiana is the Reed plane . . . bringing the Reed man and his knowledge of rotary drilling tools to a drilling barge.* His transportation may be unusual but the contact with isolated rigs to learn their needs and offer time- and money-saving advice is a regular part of the Reed man's work . . . a task which is daily routine.

Onshore or offshore . . . on a mountain side or in a marshland . . . you can be certain the Reed man will get to your location by whatever means of transportation will get him there at the time he can be most helpful.

* Reed initiated this service in 1950 to become the first oil tool manufacturer to have its own plane for regular contact with water-location drillsites.

REED

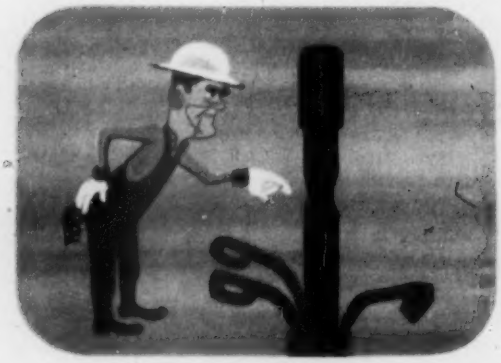
ROLLER BIT COMPANY

HOUSTON 1, TEXAS

NEW YORK LONDON BUENOS AIRES

. . . right at the

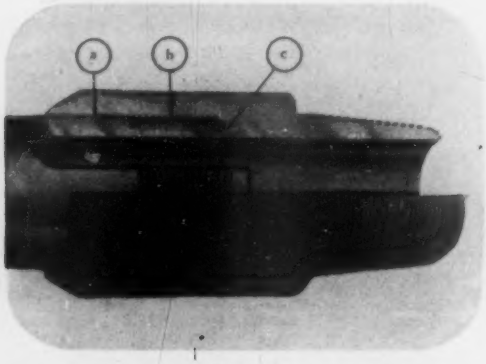
Take a look at the tool joint that's right for your rig



1. **Longer Tool Joint Life:** When pipe must be discarded, the tool joint can often be saved. Field replaceable joints are removed from old pipe, applied to new . . . *right at the rig!*

2. **Saves Time and Money:** No need to shop pipe to change joints. After long service (or accidental damage) tool joints can be replaced . . . in minutes . . . *right at the rig!*

4. **Foolproof:** Reed's crew or your own men simply screw the heated joint onto the drill pipe until the landing shoulder strikes the end of the pipe with a "jar." The landing shoulder is a positive gauge to determine proper application of the tool joint.



5. **Here's the Payoff:** As the tool joint cools, the shrink-grip area (a) and the landing shoulder (c) form perfect seals . . . since the correct amount of shrinkage has been built-in at the factory . . . to protect the threads (b) against leaks and corrosion.

Naturally,

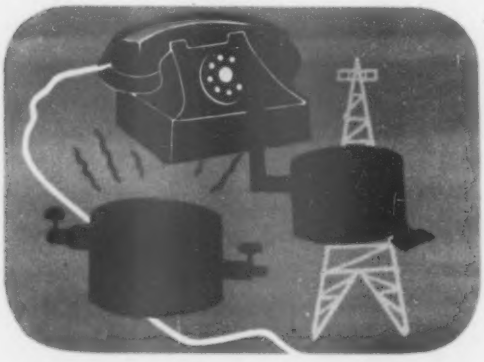
we're talking about the . . .

REED

REED ROLLER BIT COMPANY • HOUSTON 1, TEXAS . . . Gulf Coast, Mid-Continent, Rocky Mountain and

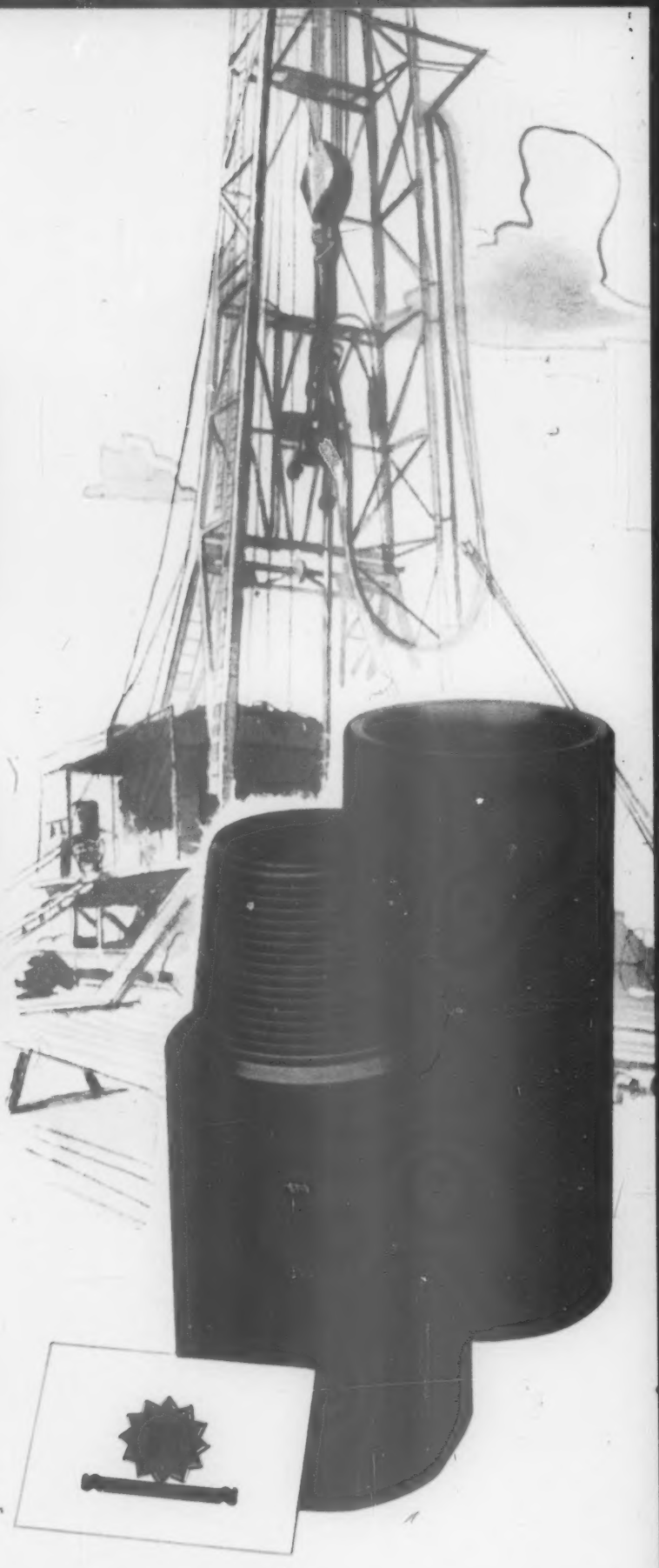
rig !

regardless of its location



3. **Just Call:** Reed will send a crew and portable heaters to do the complete job, or, the necessary equipment and a man to instruct your crew in its use . . . it's that simple.

6. **Practical and Trouble-free:** With both interior and exterior access to the threads fully sealed and the land preventing creeping, the threads are protected against galling, leaks and corrosion—thus making it practical to replace the joint in the field.



TOOL JOINT!

Canadian Distributor for Martin-Decker Products

Buying Drill Collars through your supply store makes good sense
And Reed Drill Collars are the best your supply store has to offer
You can't go wrong when you buy the products on which your supply man banks his reputation every day . . . with every sale.
Your supply man can tell you that Reed drill collars will help you avoid costly troubles resulting from misalignment of connections, thread galling, and other premature connection failures.
Alloy steels made to Reed's own specifications ... scientifically controlled all-over heat treating ... precision machining ... anti-galling treatment of threads which changes the thread surfaces to iron and manganese phosphates ... make Reed Drill Collars the most economical in the field.
REED
ROLLER BIT COMPANY

PERSONALS

Socony's Jackson rises . . .

. . . From Fireman to Executive

REA JACKSON is one oil-company executive who hasn't forgotten what he learned as a refinery stillman.

On February 1 he becomes general manager of the manufacturing department and chairman of the manufacturing committee of Socony Mobil Oil Co., Inc.

This latest recognition of his ability to get a job done tops off a long and varied succession of duties in petroleum refining and administration. His many posts in the Socony organization have made him a world traveler. But he feels that there is no substitute for the experience he gained the hard way in his early days of refinery operation.

With a degree in chemical engineering from the University of Texas, he went to Beaumont as a chemist and was put on Magnolia Petroleum Co.'s payroll in 1923. Prior to this he had served during World War I in Europe with the 132nd Field Artillery, 36th Division.

After a hitch in the chemical laboratories at Beaumont, Jackson decided that he'd learn more about the business by getting his hands dirty and asked for a transfer out into the plant. He got it and started as a fireman on the coke stills.

Practical refinery experience . . . From fireman he progressed to back man, to top man, to house man, and stillman, titles which aren't too familiar in refinery labor circles today.

His ability to handle supervisory assignments was proved when he was made shift foreman and from there he moved up to night superintendent, general foreman, assistant superintendent, and in 1936 superintendent.

He laughingly recalls keeping his operators on their toes in those days by knowing from experience the location of all the warm spots in the plant in winter and all the cool spots in summer.

Eleven years later he left Beaumont and went to Socony's Paulsboro refinery as manager, continuing on to New York in 1950 as a member of the company's manufacturing committee.

In 1953 he went to Washington as director of the refining division of Petroleum Administration for Defense, later becoming assistant and then associate deputy administrator. He values this tour of duty particularly for the opportunity it gave him to become better acquained with other industry men.

Shortly after unpacking his bags from Washington, he repacked them again to become New York manager of the company's foreign refining operations. Two years of fairly solid travel followed, and Jackson joined the newly formed Mobil Overseas Oil Co. January 1 this year.

Interest in antiquity . . . Back on the domestic scene, Jackson looks forward to indulging his interest in history through the New York Historical Society and the Metropolitan Museum of Art.

His extensive travels through Europe and the Eastern Mediterrean countries gave him a number of chances to bolster his knowledge of antiquity and he especially prized being in Egypt when the ancient burial ship was unearthed there last year.

Jackson is no clubman but he is proud of a lifetime membership in Rotary. He is also a Mason. The Jacksons live in Manhattan. Their son is a doctor in Houston.

R. J. Hengstebeck has been promoted by Standard Oil Co. (Ind.) from group leader to research associate in the research division's process section. He is succeeded by **Dr. H. G. Crane.** Other changes: **Dr. Philip Hall,** from group leader to patent adviser; **Dr. P. N. Rylander,** to succeed Hall; and **E. P. Easterday,** named assistant to the research department's administrative director, Chicago.

E. Floyd Humphries has been named assistant chief geologist of Texas Illinois Natural Gas Pipeline Co., affiliate of Natural Gas Pipeline Co. of America. Humphries has been active in offshore exploration for both firms.

C. C. Combs, former controller of Shell Oil Co. of Canada, Ltd., has been elected vice president and treasurer of Shell Pipe Line Corp. He succeeds **W. A. Baker,** who retired recently.

Robert L. Schmidt has resigned as Rocky Mountain division geophysicist for Sinclair Oil & Gas Co. and Forest Oil Corp. at Denver to become a consultant there.

J. A. Coleman has resigned as engineer with Sinclair Oil & Gas Co. at Hobbs, N. M., to become a partner in Beal-Coleman Engineering Co., new petroleum-engineering service firm there.

D. N. Rindsberg has been advanced from operating department manager to assistant technical superintendent at Shell Chemical Corp.'s Houston plant. **J. H. Laws** succeeds Rindsberg.

George L. McLernon, Jr., former chief engineer for Mid-States Oil Corp., has joined APA, Inc., as Tulsa operations manager. APA, set up to manage oil properties, is one of four affiliated Minneapolis firms that began operations in Oklahoma 3½ years ago. With Apache Oil Corp., exploration affiliate, the firm plans to drill between 60 and 80 wells in the state this year.

R. D. PATCH

Ralph D. Patch, head of the petroleum products division at Esso Standard Oil Co.'s Baton Rouge refinery, has been named management adviser at Esso A.G.'s Hamburg, Germany, refinery. **D. M. Cox,** former head of the technical division at Baton Rouge, succeeds Patch. Cox is succeeded by **Dr. R. K. Dix,** crude and product coordination department head at Baton Rouge.

J. W. Morgan, assistant manufacturing manager of British American Oil Co. since 1954, has been named to the new post of general manager of manufacturing. Named general manager of marketing was **A. E. Osborough.**

PERSONALS

West Central Texas A.I.M.E. Chooses New Officers

James E. Russell, Russell Engineering Co., seated center, has been elected 1956 chairman of the West Texas Section, American Institute of Mining, Metallurgical and Petroleum Engineers. Other new officers: seated, E. L. Anders, consultant, secretary-treasurer; and Jack Evans, Warren Petroleum Corp., second vice chairman. Standing, left to right, are Lem Neely, independent, first vice chairman; R. M. Bowen, Roark, Hooker & Roark, director; L. D. Webster, with Sid Katz, independent, director; and Harrison Nugent, Schlumberger Well Surveying Corp., director. All are from Abilene, Tex.

A. R. Dudley has been promoted to senior chemical engineer in the technical service division of Humble Oil & Refining Co.'s Baytown, Tex., refinery.

Ernest Utterback, Vernon O. Bowles, Andrew K. Brumbaugh, and **Benjamin F. Hartman** have been named new assistant managers of Socony Mobil Oil Co., Inc.'s refinery engineering division. The promotions came as the division was reorganized to handle Socony's stepped-up refinery building program. Utterback, former chief mechanical engineer, will head the project section. Bowles, former chief process engineer, will supervise the development section. Brumbaugh, who will head the design section, has been project manager for construction of Standard Vacuum Oil Co.'s Altona, Australia, refinery. Hartman, former technical director at Socony Mobil's Augusta, Kans., refinery, becomes head of general engineering. Other changes: **Austin C. Brightman,** former chief process engineer, becomes administrative assistant to the division manager; **Roy M. Owens, D. G. Van Tilburg, R. E. Redfield,** and **James I. Lawrence** have been named project managers in the project section. Owens has been chief foreign project engineer; Van Tilburg, process engineer; Redfield, chief maintenance and corrosion engineer; and Lawrence, chief engineer at Socony Mobil's Paulsboro, N. J., refinery.

Otto B. Schoenfeld has resigned from Visco Products Co., Houston, to join Osage Petroleum Co., Bartlesville, Okla., as development and production vice president. Before joining Visco, Schoenfeld was a petroleum engineer for The Texas Co.

Rex D. Schropp has been promoted by Phillips Petroleum Co. from district staff engineer at Big Spring, Tex., to division staff engineer at Midland, Tex.

Earl W. Unruh, former chief engineer and part-interest executive for Sinclair Pipe Line Co., has been elected a vice president and director.

Stuart Hastings, formerly with Sun Oil Co. in Beaumont and The Texas Co. in Los Angeles, has joined Phillips Petroleum Co. as geologist in Lafayette, La.

Warren Thompson, former assistant director of research and development for D-X Sunray Oil Co., Tulsa, has been advanced to research and technical services division manager. Other changes at D-X Sunray, refining subsidiary of Sunray Mid-Continent Oil Co.: **L. D. Stewart,** from assistant general superintendent of the West Tulsa refinery to assistant manager, research and technical services division; **J. A. Middleton,** assistant general mechanical superintendent at West Tulsa to manager, engineering construction and maintenance department; and **Gayle Rogers,** former manager of Sunray Oil Corp.'s technical service department (before last year's merger with Mid-Continent), becomes assistant to the executive vice president for manufacturing of Sunray Mid-Continent.

New York Nomads Name 1956 Officers

Herb E. Malland, of R. J. Eiche & Associates, seated, center, has been elected 1956 president of the New York chapter of National Oil Equipment Manufacturers and Delegates Society. Other new officers are, seated, left to right, Don E. Kircher, Gardner-Denver Co., sergeant-at-arms; Dave C. Washburn, Cameron Iron Works, Inc., treasurer; E. E. Anderson, W-K-M Manufacturing Co., Inc., secretary; and Stewart D. Beckley, of Beckley, Haltom & Hickman, outgoing president and new regent. Standing, left to right, are R. E. James, Security Engineering Division, assistant sergeant-at-arms; F. L. Crabbe, Black Export Co., assistant secretary; and Jesse Hickman, of Beckley, Haltom & Hickman, assistant sergeant-at-arms. Not shown: Maurice F. Delano, R. S. Stokvis & Sons, Inc., vice president; D. T. O'Connor, assistant treasurer; and N. L. Boulden, Jr., International General Electric Co., Inc., regent.

PERSONALS

Bledsoe to Head Pipe Line Contractors

Clark C. Bledsoe, vice president of Midwestern Constructors, Inc., Tulsa, has been elected president of the Pipe Line Contractors Association for 1956. The new officers, named at the group's recent eighth annual convention at Boca Raton, Fla., are, seated, left to right, John H. Williams, head of Williams Brothers Co., Tulsa, second vice president; Bledsoe; Earl Allen, Associated Pipe Line Contractors, Inc., Houston, first vice president; Kenneth A. Owen, Parkhill Truck Co., Tulsa, treasurer; and Richard A. Gump, Dallas, executive secretary. Elected directors are, standing, left to right, G. A. Manuel, Williams-Austin Co., Pittsburgh; R. P. Gregory, Houston Contracting Co., Houston; Harold C. Price, H. C. Price Co., Bartlesville, Okla. (retiring president); M. S. Williams, Panama-Williams Corp., Houston; Robert D. Sheehan, Sheehan Pipe Line Construction Co., Tulsa; James P. Neill, Western Constructors, Dallas; Jack S. Gray, Grayco Construction Co., Inc., Austin; and R. A. Conyes, Conyes Construction Corp., San Pablo, Calif.

Elbert F. Davis, Continental Oil Co. production engineer, has been transferred from Linch, Wyo., to Ville Platte, La.

Dave Archer has resigned as geologist for Union Oil Co. of California in Abilene, Tex., to join Sohio Petroleum Co. in Lafayette, La.

D. A. East, general manager of Stanolind Oil Purchasing Co., has been elected a director. East replaces **R. O. Dietler,** who retired recently.

Ralph D. Loughman, former geologist with International Petroleum Co. in Bogota, Colombia, has joined Continental Oil Co. in Oklahoma City.

Arthur J. Monzingo has been transferred by Magnolia Petroleum Co. from district petroleum engineer at Salem, Ill., to production foreman at Snyder, Tex.

Richard B. Palmer, geologist for The Texas Co., has been transferred from Bakersfield, Calif., to the division geological office in Los Angeles.

Hayden Atchison, British American Producing Co., Midland, Tex., has been named to head the West Texas Geological Society during 1956. Others elected: **T. S. Jones,** Union Oil Co. of California, vice president; **Harward Fisher,** University Lands, secretary; and **A. D. Slover,** Honolulu Oil Corp., treasurer.

Bill Barnes, district geologist for Sinclair Oil & Gas Co. at Bismarck, N. D., has been transferred to Fort Worth.

A. P. Frame and **Charles S. Mitchell,** directors of Cities Service Co., have been named vice presidents. Frame, who heads manufacturing, research and petrochemical activities, has been with

A. P. FRAME

C. S. MITCHELL

Cities Service 31 years. He is president and a director of Cities Service Research & Development Co. and vice president of several other subsidiaries. Mitchell, a 25-year Cities Service veteran, has managed transportation and crude-oil supply since 1953. Other directors named vice presidents: **George H. Shaw,** industrial relations counsel; and **George H. Hill, Jr.,** a vice president and director of several Cities Service subsidiaries.

Orrin E. O'Connor has been promoted from assistant manager to manager of purchases in Quaker State Oil Refining Corp.'s general purchasing department, Oil City, Pa.

Kermit G. Rowley has resigned as exploitation engineer with Shell Oil Co. at Hobbs, N. M., to join Magnolia Petroleum Co. as petroleum engineer at Morgan City, La.

Orville L. Fisher, general manager of Continental Oil Co.'s southern production division since 1952, has been named vice president. He will remain in Houston as division manager.

Dr. John E. Kasch has been made manager of coordination and **Charles F. Feuchter** manager of planning in American Oil Co.'s manufacturing department.

Lewis T. Wilson, former assistant superintendent of Three States Natural Gas Co., Price, Utah, has been transferred to Fort Smith, Ark., as field representative for Reynolds Mining Corp.'s oil and gas division.

Eugene Holman, chairman of Standard Oil Co. (N. J.), has been elected chairman of the Commerce Department's business advisory council for 1956. **S. D. Bechtel,** head of Bechtel Corp., was named a vice chairman.

PERSONALS

Ernest B. Johnson has been promoted by Service Pipe Line Co. from senior engineer to cost engineer.

Howard W. Schwartz, Stanolind Oil & Gas Co. geologist in Calgary, has been named representative in Jamaica for Jamaican Stanolind Oil, a subsidiary.

Laurence C. Curtright, Jr., formerly with Socony Mobil Oil Co., Inc., has joined Amstutz & Yates, Inc., Wichita consultants.

H. F. Hillard, formerly chief engineer for Mountain Fuel Supply Co., has become a consultant in Salt Lake City.

R. L. Lay, assistant to the vice president of The Texas Co.'s domestic producing department, will become assistant to the vice president for foreign operations, Eastern Hemisphere, effective March 1. Lay succeeds **W. N. Holt,** who will transfer to London as vice president and a director of The Texas Co. (Iran), Ltd., and as deputy shareholder's representative. **J. H. Rambin, Jr.,** now assistant general manager of Texaco's domestic producing department, Houston, will succeed Lay in the firm's New York headquarters.

R. L. LAY

J. H. RAMBIN, JR.

Lynn K. Lee, Fort Worth consultant, has been elected president of the Fort Worth Geological Society for 1956. Other new officers are: **W. L. Gupton,** Texas Pacific Coal & Oil Co., first vice president; **J. A. Bodin,** Schlumberger Well Surveying Corp., second vice president; **Arthur S. Gale,** the Chicago Corp., secretary; and **M. L. Miles,** Gulf Oil Corp., treasurer.

Dr. Robert V. West, Jr., former drilling and production superintendent for Slick-Moorman Oil Co., has been named president of Slick Secondary Recovery Corp. West, who has been with the Slick interests 7 years, earlier worked for Humble Oil & Refining Co. *West is the author of a new Journal series on electric logging, the first installment of which appears on pages 268 and 271 of this issue.*

Gene Graham, executive vice president and a director of the now-defunct Thomas Pike Drilling Co., has formed Graham Drilling Co., with offices in Los Angeles. The firm will operate three strings of tools for contract drilling in California, Oregon, and Washington. Five other strings will be available for expansion. Before joining Pike, Graham for many years was vice president of Rocky Mountain Drilling Co.

B. L. Goepfert, Shell Oil Co. mechanical engineer, has been transferred from the marine production department, New Orleans, to the technical services division, Houston.

H. L. McDonald has been named coordinator, joint operations, in Pan American Production Co.'s Houston office. McDonald joined the firm in 1946 as petroleum engineer.

Joe Beard, formerly with Tennessee Gas Transmission Co., has joined Trice Production Co. as district manager in Wichita Falls, Tex.

Robert T. Tennant has resigned as petroleum engineer for Gulf Oil Corp. in Houston to become co-owner of Tennant Drilling Co., Blackwell, Okla.

Dr. Thomas B. Nolan, assistant director of the U. S. Geological Survey since 1944, has been named director pending Senate approval. He succeeds **Dr. William E. Wrather,** who retired recently due to ill health. Nolan, a minerals specialist, joined the USGS in 1924 as junior geologist.

DR. T. B. NOLAN

DEATHS

Earl Sneed, Sr., pioneer Oklahoma oil operator, attorney, and journalist, died January 19 in his Tulsa home. He was 71. Sneed entered the industry as an attorney about 1920, and later became vice president of the Humphries-Fohs companies. He played a leading role in the development and sale of the Mexia-Humphries-Fohs properties to Pure Oil Co. At death he was president of Sneed Oil Co.

Wilfred J. (Bill) Grisdale, 40, cofounder of Atlas Supply Co., Mount Pleasant, Mich., was killed recently in an auto accident near Duton, Ont. Grisdale also founded Turret Supply Co., Ltd., Sombra, Ont.

Christian A. Schmuck, 85, retired (1923) production superintendent for Burma Oil Co., died January 16 in Tampa, Fla.

Dr. S. D. Douglas, senior scientist in Carbide & Carbon Chemicals Co.'s research department, died January 15 in Houston. He was one of the foremost research scientists in the field of plastics.

William A. Kearney, 67, active in the Interior Department's oil programs 42 years until his retirement in 1949, died recently in Washington. Kearney served as an administrative assistant in the old Oil and Gas Division, the U.S.G.S., and the Petroleum Administration for War.

Orlando Wells, 77, a pioneer in South American exploration and well-known geologic-map maker, died recently in New York. Wells, active in the industry since 1902, was president of International Map Co., a firm he founded in 1922. He also was president and director of Southern Exploration Co., New York, a director of Wichita River Oil Corp., Wichita Falls, and secretary, treasurer, and director of Venezuelan Holding Corp.

Ludger Mintrop, 76, German scientist who designed the first seismograph equipment used in this country, died recently in Essen-Werden, Germany. He had lived in Houston during the 1920's.

Tom T. Hawksworth, 57, who a year ago founded Hawksworth Oil, Inc., Tulsa, died January 22 in Paris, Tex.

G. C Stewart, 68, retired Sun Pipe Line Co. station engineer and Spindletop pioneer, died January 18 in Beaumont. Stewart had been a Sun employe 40 years before retiring in 1950.

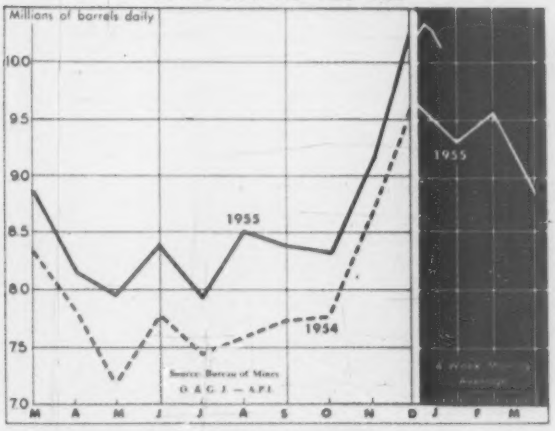
Robert Lee Lothringer, 33, research chemist for Sinclair Oil & Gas Co., died January 22 in Tulsa.

Latest Figures . . . Industry Trends

A QUICK LOOK AT THE HIGHLIGHTS

	LATEST WEEK	Change from WEEK AGO		Change from YEAR AGO	
Production	7,051,525	UP	49,750	UP	229,481
Crude stocks	259,188,000	DOWN	910,000	UP	2,669,000
Completions	1,182	UP	143	UP	78
Refinery runs	7,952,000	UP	3,000	UP	773,000
Gasoline stocks	175,785,000	UP	3,879,000	UP	9,500,000
Kerosine stocks	22,711,000	DOWN	1,723,000	DOWN	3,407,000
Distillate stocks	94,610,000	DOWN	6,464,000	DOWN	1,260,000
Residual stocks	39,012,000	DOWN	313,000	DOWN	10,919,000
Four-product stocks	332,118,000	DOWN	4,621,000	DOWN	6,086,000
Total imports	1,266,500	UP	76,500	UP	160,300

TOTAL DEMAND—ALL OILS



Distillate Markets Will Fluctuate Sharply With Temperature Changes

DISTILLATE market strength at this time of the year is more sensitive to weather changes than earlier in the heating season. Lower temperatures in the North Central states produced very tight markets for home-heating oils in December. Prices moved up each week during the month for an over-all gain of 0.75 cent a gallon for the Group 3 market between the end of November and January 4.

Continuation of cold weather in portions of the area served by the Great Lakes pipeline has tended to tighten the Group 3 market for light heating oils.

Some suppliers in the Mid-Continent still are selling No. 2 fuel to jobbers at 9.0 cents a gallon plus delivery charges, but this is becoming more of an exception than the general rule. Since some spot material is still moving at 9.0 cents Group 3, this price is carried as the low. In many cases a supplier is able to get 0.125 cent or 0.25 cent above this quotation for any No. 2 in excess of contract requirements.

If cold weather continues in the inland areas, all quotations may move up to as much as 9.25 cents for No. 2 on the Group 3 market. On the other hand, mild weather for as much as 2 weeks would tend to bring out material that no one has been able to find for the past few weeks.

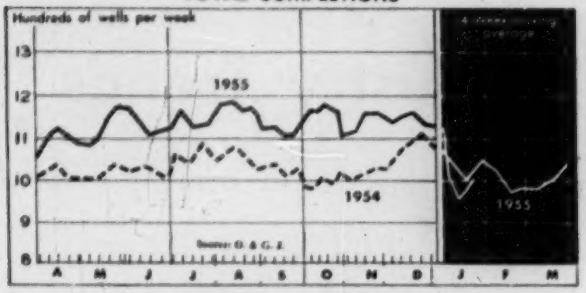
Loss by strike offset by weather . . . The strike of fuel-truck drivers in New York City lasted 5 days. Deliveries that were delayed by the strike are added to the normal sales to consumers to create a very heavy movement out of primary and secondary storage in the area. However, the strike may have produced a slight reduction in over-all consumption for January. Some customers with oil low in their tanks held daily consumption to a minimum. The difference between this minimum use and normal consumption represents a loss that will not be regained. But, the loss is likely to be overshadowed by temperature changes during the remaining portion of the heating season.

Natural-gasoline prices settled down at 5.5 cents a gallon for Grade 26-70 on the Group 3 market and 5.0 cents at Breckenridge. The Group 3 price dropped on January 19. Breckenridge had a split price of 5.0-5.5 cents from January 17 through January 20. If natural follows the normal pattern of seasonal fluctuations, another cut may come in February.

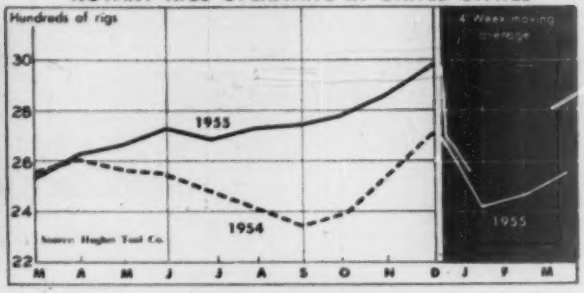
Tanker rates increase . . . Tanker rates are increasing, but the rate of climb is slower than earlier in the season and much lower than the sharp drop at the first of the year.

Latest reported clean fixture for the Gulf-North of Hatteras voyage was USMC plus 80 per cent compared with USMC plus 75 per cent a week ago. Dirty tonnage is up to USMC plus 40 per cent from USMC plus 25 per cent. Latest for Netherlands West Indies-North of Hatteras was USMC plus 40 per cent, up from USMC plus 20 per cent a week ago.

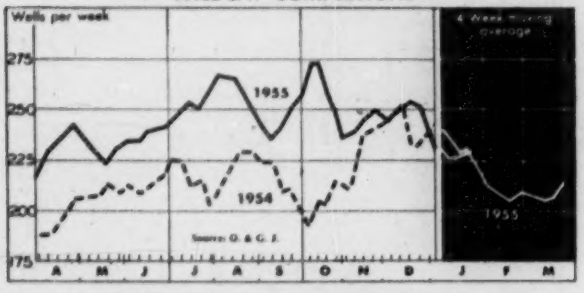
TOTAL COMPLETIONS



ROTARY RIGS OPERATING IN UNITED STATES



WILDCAT COMPLETIONS



ACTIVE ROTARY RIGS*

Area—	1-23-56	Change from 1-16-56	Change from 1-24-55
Gulf Coast	648	—7	113
N. and W. Texas-New Mexico	859	—40	86
Arkansas-N. Louisiana-E. Texas	155		—17
Oklahoma	284	—24	11
Kansas-S. Nebraska	181	15	24
Illinois-Eastern	94	—12	—32
Rocky Mountain	206	—15	8
Pacific Coast	130	—1	—17
Total United States	2,557	—84	176
Western Canada	222	9	29

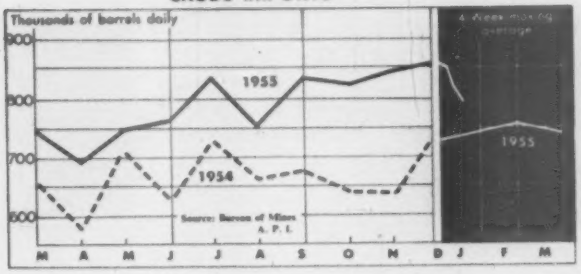
*Hughes Tool Co.

WEEKLY WELL COMPLETIONS . . . WEEK ENDED JANUARY 21, 1956

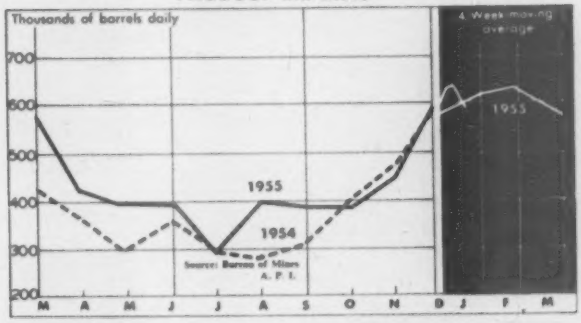
	Total of all wells: Comp.	Oil	Gas	Dry	Footage	Cum. 1956	Cum. 1955	Wildcat completions and discoveries: Oil	Dist.	Gas	Dry	Total	Cumulative total, 1956: Oil	Dist.	Gas	Dry	Total
Ala.-Ga.-Fla.	2	1	0	1	21,035	6	9	0	0	0	1	1	0	0	0	3	3
Arkansas	12	9	0	3	32,262	42	25	0	0	0	1	1	1	0	0	7	8
California	40	34	0	6	190,462	118	135	0	0	0	4	4	0	0	0	18	18
Colorado	21	1	3	17	116,283	70	76	0	0	0	9	9	0	0	1	34	35
Illinois	86	38	0	48	199,843	273	255	1	0	0	12	13	5	0	0	40	45
Indiana	15	5	1	9	25,288	36	44	1	0	0	2	3	2	0	0	9	11
Kansas	105	45	11	*49	359,248	255	319	3	0	1	27	31	5	1	1	60	67
Kentucky	68	29	5	34	95,659	121	88	3	0	0	15	18	3	0	0	30	33
Louisiana	104	60	8	36	626,934	291	247	0	3	0	13	16	3	7	1	40	51
North	55	35	7	13	156,462	126	142	0	0	0	6	6	2	0	0	17	19
South	38	18	1	19	366,669	138	105	0	2	0	6	8	1	6	1	21	29
Offshore	11	7	0	4	103,803	27	-	0	1	0	1	2	0	1	0	2	3
Michigan	6	1	0	5	13,739	36	39	0	0	0	3	3	1	0	0	11	12
Mississippi	7	6	0	1	66,800	39	24	2	0	0	1	3	4	0	0	13	17
Montana	8	3	0	5	23,314	31	24	0	0	0	2	2	1	0	0	9	10
Nebraska	14	1	0	13	79,678	53	41	0	0	0	11	11	1	0	0	28	29
New Mexico	89	36	37	16	390,542	136	56	2	0	1	5	8	3	0	2	8	13
Northwest	42	0	35	7	144,449	56	11	0	0	1	1	2	0	0	2	2	4
Southeast	47	36	2	9	246,093	80	45	2	0	0	4	6	3	0	0	6	9
North Dakota	1	1	0	0	8,313	12	12	0	0	0	0	0	0	0	0	3	3
Ohio	28	13	5	10	67,066	77	57	0	0	0	0	0	0	0	0	1	1
Oklahoma	176	100	6	160	565,176	494	454	0	0	1	15	16	8	5	1	43	57
Pennsylvania-New York	0	0	0	0	0	9	106	0	0	0	0	0	0	0	1	0	1
Texas	369	233	19	117	1,590,698	1,180	1,076	19	1	4	66	90	56	6	13	282	357
Southwest (1 & 4)	41	21	5	15	152,956	189	162	2	1	2	13	18	14	2	3	58	77
Gulf Coast (2 & 3)	38	21	1	16	261,138	180	157	1	0	0	10	11	14	3	5	52	64
East (5 & 6)	22	5	4	13	122,237	76	73	0	0	1	9	10	0	1	1	29	31
North Central (7-B & 9)	144	84	1	59	450,751	403	347	11	0	0	25	36	25	0	1	89	115
West (7-C & 8)	94	81	1	12	492,311	278	277	5	0	0	9	14	13	0	2	52	67
Panhandle (10)	30	21	7	2	111,305	54	60	0	0	1	0	1	0	0	1	2	3
Utah	0	0	0	0	0	2	5	0	0	0	0	0	0	0	0	1	1
West Virginia	2	0	2	0	5,419	28	36	0	0	0	0	0	0	0	0	0	0
Wyoming	31	13	1	17	165,655	57	35	0	0	1	10	11	1	0	2	22	25
Miscellaneous (Md., Va.)	8	0	7	1	37,047	9	3	0	0	0	0	0	0	0	0	1	1
Total United States	1,182	629	105	448	4,680,461	3,375	3,166	31	4	8	197	240	94	19	22	663	798
Total previous week	1,039	514	76	449	4,314,752			23	5	6	239	273	63	15	14	466	558
Total January 22, 1955	1,104	650	68	386	4,436,196			33	6	8	179	226	77	9	23	566	675
Western Canada	31	25	2	4	174,788	124											

Service wells included: *1, †3.

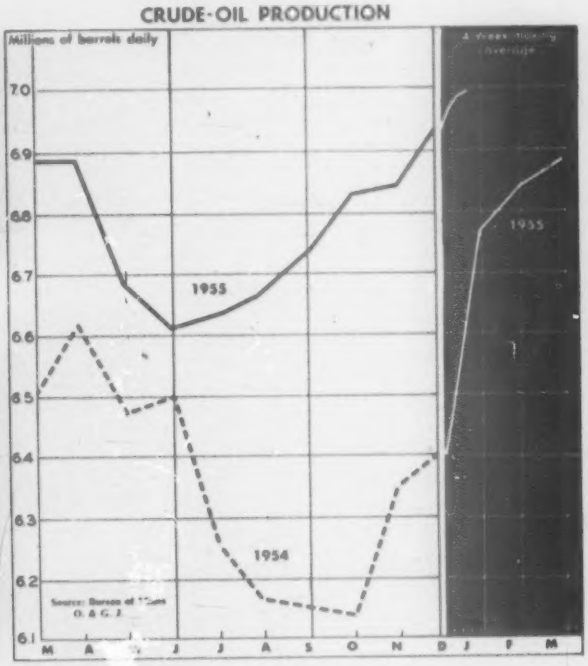
CRUDE IMPORTS



PRODUCT IMPORTS



CRUDE-OIL PRODUCTION

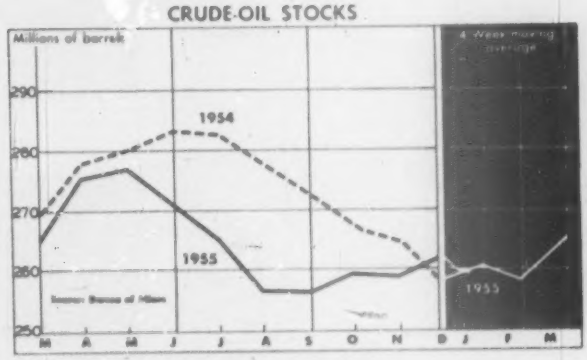


DAILY AVERAGE PRODUCTION FOR WEEK

	January 21			Jan. 14
	Crude oil	Lease condensate	Total	total
Alabama	4,000		4,000	4,300
Arkansas	72,300	450	72,750	74,400
California	979,700		979,700	979,000
Colorado	161,000		161,000	153,200
Eastern	48,500		48,500	49,000
Florida	1,350		1,350	1,350
Illinois	231,200		231,200	234,100
Indiana	31,300		31,300	30,700
Kansas	348,800		348,800	333,900
Kentucky	44,500		44,500	44,400
Louisiana	728,400	61,200	789,600	787,100
North	116,400	2,200	118,600	116,100
South	612,000	59,000	671,000	671,000
Michigan	31,400		31,400	29,800
Mississippi	106,000	5,350	111,350	111,350
Montana	41,600		41,600	40,200
Nebraska	28,600		28,600	28,900
New Mexico	227,700	3,900	231,600	231,900
North Dakota	38,200		38,200	39,800
Oklahoma	610,700		610,700	584,200
Texas	2,885,000	53,050	2,938,050	2,938,050
Dist. 1	48,000	650	48,650	48,650
Dist. 2	153,000	8,200	161,200	161,200
Dist. 3	428,000	25,000	453,000	453,000
Dist. 4	242,000	5,300	247,300	247,300
Dist. 5	46,000	550	46,550	46,550
Dist. 6	127,500	5,700	133,200	133,200
East Texas field	223,500		223,500	223,500
Dist. 7-B	150,000	50	150,050	150,050
Dist. 7-C	169,000	4,800	173,800	173,800
Dist. 8	1,010,000	2,000	1,012,000	1,012,000
Dist. 9	196,000	600	196,600	196,600
Dist. 10	92,000	200	92,200	92,200
Utah	5,700		5,700	5,600
Wyoming	281,400		281,400	280,300
Others	‡225		‡225	225
Total U. S.	6,907,575	123,950	**7,031,525**	6,981,775
Change from previous week, up			**49,750**	
Canada	†467,100		†467,100	421,900
Total U. S. production January 1-21				147,133,875 bbl.
Same period last year (crude plus cond.)				‡141,410,600 bbl.

*Includes 2,368,975 bbl. condensate. †Week ended previous Monday. ‡Nev. 200, Ariz. 25.

CRUDE-OIL STOCKS



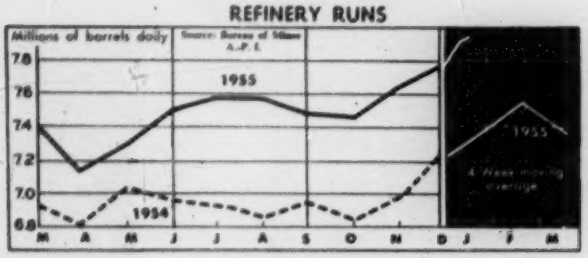
CRUDE-OIL STOCKS BY STATES OF ORIGIN*

(Thousands of barrels)

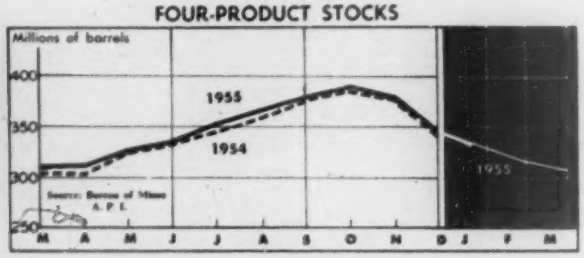
	1-14-56	1-7-56	1-15-55
Pennsylvania Grade	2,768	2,867	2,969
Other Appalachian	2,081	2,131	1,683
Illinois, Indiana, Michigan	9,217	9,213	10,798
Nebraska, North Dakota	1,987	2,011	1,848
Kansas	8,112	7,684	8,474
Oklahoma	21,816	21,403	24,917
Arkansas	2,003	2,174	2,851
Louisiana	15,717	15,798	14,700
North	2,664	2,699	2,246
South	13,053	13,099	12,454
Mississippi	3,105	2,945	3,205
New Mexico	7,933	7,883	7,782
Texas	123,437	124,466	117,238
East Texas proper	9,083	9,433	9,663
West Texas	58,062	57,848	51,272
Texas Gulf	24,934 b	24,542	23,884
Other Texas	31,358	32,643	32,419
Wyoming	15,674	15,259	13,208
Other Rocky Mountain	5,877	6,237	5,999
California	27,953	27,894	30,377
Foreign	†11,508	12,133	10,470
Total	259,188	260,098	256,519

*Bureau of Mines. †Includes 1,963,000 bbl. in California.

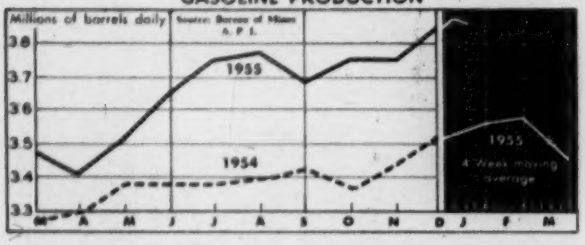
REFINERY RUNS



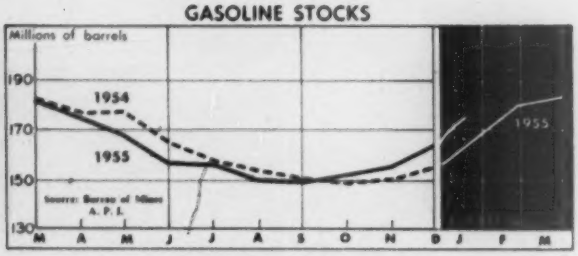
FOUR-PRODUCT STOCKS



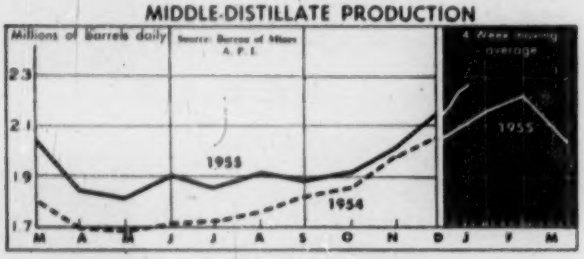
GASOLINE PRODUCTION



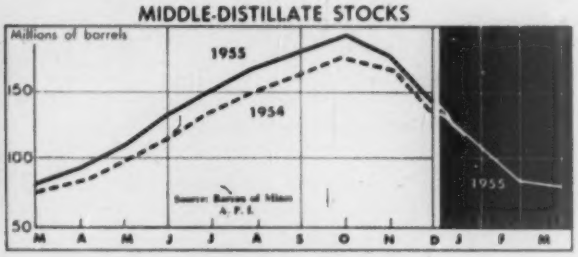
GASOLINE STOCKS



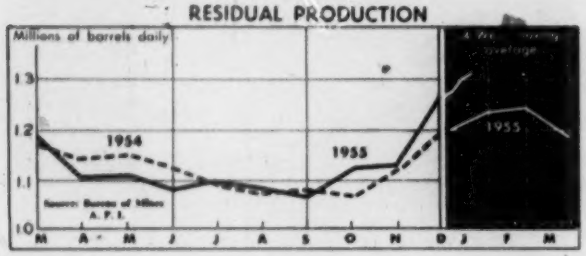
MIDDLE-DISTILLATE PRODUCTION



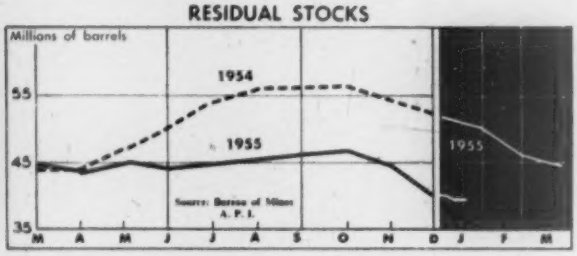
MIDDLE-DISTILLATE STOCKS



RESIDUAL PRODUCTION



RESIDUAL STOCKS



A.P.I. REFINERY REPORT, JANUARY 20
(Thousands of barrels)

District—	Daily avg. runs	Daily average production Gaso.*	Kero.	Dist.	Resid.	Stocks‡ Gaso.†	Kero.	Dist.	Resid.	Bureau of Mines, January 1955 Daily avg. runs	Daily average production Gaso.*	Kero.	Dist.	Resid.
East Coast	1,116	468.8	43.9	299.3	283.3	36,067	9,187	33,024	11,153	1,151	454.5	40.7	313.5	234.7
Appalachian:														
District 1	106	42.1	6.9	27.6	13.7	4,687	592	1,907	532	104	43.1	6.3	24.6	8.6
District 2	106	51.0	9.3	17.0	15.9	2,618	339	646	277	92	43.7	7.9	15.2	15.3
Ind., Ill., Ky.	1,554	764.8	81.8	335.3	224.7	35,977	5,272	16,074	4,075	1,352	688.8	84.2	301.3	185.6
Okla., Kans., Mo.	777	448.0	19.6	208.4	39.1	19,777	1,009	9,968	1,119	678	393.0	17.3	159.3	50.5
Inland Texas	285	204.9	11.0	49.7	28.0	6,197	400	1,774	1,320	251	181.0	11.4	50.2	21.3
Texas Gulf Coast	1,825	859.7	126.0	517.7	264.0	25,314	2,938	10,990	6,714	1,798	814.5	148.0	487.2	235.0
La. Gulf Coast	696	325.3	61.7	189.2	61.3	10,319	1,868	4,974	1,316	622	298.8	70.2	142.4	51.0
N. La. and Ark.	95	35.4	8.7	21.1	9.0	4,474	523	1,825	62	95	35.7	9.7	19.6	7.0
Rocky Mountain:														
New Mexico	21	10.9		3.7	2.9	211	7	52	29	20	12.3	0.6	3.0	2.8
Other Rocky Mt.	280	134.9	2.3	72.0	44.1	6,516	264	2,535	745	262	127.2	4.9	64.1	42.8
California	1,091	449.3	4.1	198.3	345.0	23,628	312	10,841	11,670	1,056	464.7	7.3	159.1	380.1
Jan. 20, 1956	7,952	3,795.1	375.3	1,939.3	1,331.0	175,785	22,711	94,610	39,012	7,481	3,557.3	408.5	1,739.5	1,234.7
Jan. 13, 1956	7,949	3,835.3	349.7	1,934.4	1,311.3	171,906	24,434	101,074	39,325					
Jan. 21, 1955	7,179	3,494.9	374.6	1,750.9	1,163.0	166,285	26,118	95,870	49,931					

*At refineries including natural blended. †Finished and unfinished. ‡At refineries, bulk terminals, in transit, and in pipe lines.

Crude-oil and refinery prices at representative U. S. and foreign points

REFINED-PRODUCT PRICES

Following quotations are for refinery products in cents per gallon moving in interstate shipments on Wednesday each week unless otherwise noted. Crude-oil prices are per barrel at the wells unless otherwise listed.

GASOLINE*

Mid-Continent (Group 3):	
Regular (86 octane)	11.00-11.25
Premium (94 octane)	12.50-12.75
Gulf Coast (Cargoes for coastwise or export movement):	
Regular (90 octane)	11.00-11.25
Premium (97 octane)	13.00-13.25
New York (barges):	
Regular (89 octane)	12.25
Premium (96 octane)	14.50
California—Los Angeles (rack):	
Regular (84 octane)	13.10-13.15
Premium (93 octane)	14.10-15.10
Caribbean area (cargoes):	
Regular (87 octane)	10.50
Premium (93 octane)	11.50

*Quotations are for octanes shown. Prices usually vary with octane ratings within the regular, premium, and aviation grades.

NATURAL GASOLINE*

Group 3:	
★ Grade 26-70	5.5
Breckenridge:	
★ Grade 26-70	5.0

*If 26-70 natural is considered as 100 per cent, prices for lower-vapor-pressure grades increase 2.5 per cent for each unit drop in Reid vapor pressure down to and including 16-lb. Prices for grades below 16-lb. may vary slightly by areas or plants.

KEROSINE AND DISTILLATE

Mid-Continent (Group 3):	
Kerosine 42-44	10.00-10.25
Diesel oil (58 d.i. and above)	9.625-9.875
Distillate No. 1	9.625-9.875
Distillate No. 2	9.00-9.25
Gulf Coast (cargoes):	
★ Kerosine 41-43	9.5-9.625
Distillate No. 2	9.00-9.25
New York Harbor (barges):	
Kerosine 41-43	10.85
Distillate No. 2	10.35
Diesel fuel, 48-52 d.i.	10.65
Caribbean area (cargoes):	
Distillate No. 2	9.00

WAX (LB.)

Oklahoma (Group 3):	
132-135 A.m.p. (semi-refined) in tank cars	6.50
New York (export):	
126-130 A.m.p. crude scale (solid in bags or barrels)	7.10

★ Denotes change from previous week.

RESIDUAL FUEL (BBL.)

Mid-Continent (Group 3):	
★ Residual fuel (max. 1% S)	$2.10-2.20
Gulf Coast (cargoes):	
Bunker C fuel	$2.10
New York Harbor (barges):	
Bunker C fuel	$2.65
Caribbean (cargoes):	
Bunker C at Aruba, N.W.I.	$2.10
California (rack):	
Bunker C fuel, Los Angeles	$2.00

LUBRICATING OILS

Mid-Continent (Group 3):	
150-160 bright stock, solvent refined 0-10 p.p., 95 v.i.	23
200 vis. neutral oil, solvent refined, 0-10 p.p., 95 v.i.	19.75
Pennsylvania Grade:	
145-155 vis. at 210, bright stock, 8 color, 25 p.t.	22-23
200 vis. neutral (180 at 100°), 25 p.t.	20

CRUDE-OIL PRICES

GRAVITY SCHEDULE

	Signal Hill, Calif.	Mid-Cont.*	Gulf Coast Tex.†	West Tex.‡ N.M.	Wyo. (sour)
14-14.9	$1.97				
15-15.9	2.03				
16-16.9	2.09				
17-17.9	2.15				
18-18.9	2.21				
19-19.9	2.27				
20-20.9	2.33	$2.50		$2.37	
21-21.9	2.39	2.52		2.39	
22-22.9	2.45	2.54		2.41	
23-23.9	2.51	2.56		2.43	
24-24.9	2.57	2.58	$2.91	2.45	
25-25.9	2.63	2.60	2.93	2.47	
26-26.9	2.69	2.62	2.95	2.49	
27-27.9	2.76	2.64	2.97	2.51	
28-28.9	2.83	2.66	2.99	2.53	
29-29.9	2.91	2.68	3.01	2.55	
30-30.9	2.97	2.70	3.03	2.57	
31-31.9	3.04	2.72	3.05	2.59	$2.46
32-32.9	3.12	2.74	3.07	2.61	2.48
33-33.9		2.76	3.09	2.63	2.50
34-34.9		2.78	3.11	2.65	2.52
35-35.9		2.80	3.13	2.67	2.54
36-36.9		2.82	3.15	2.69	2.56
37-37.9		2.84	3.17	2.71	2.58
38-38.9		2.86	3.19	2.73	2.60
39-39.9		2.88	3.21	2.75	2.62
40 and up		2.90	3.23	2.77	2.64

*Includes Oklahoma, Kansas, North Dakota, West Texas (sweet), North Central Texas, North Louisiana, Arkansas, and Wyoming (sweet). †Low-cold-test Gulf Coast. ‡Sour.

Effective dates: California, October 17, 1955; east of California, June 15, 1953; Pennsylvania Grade, December 1, 1955.

FLAT PRICES

Louisiana:	
Cotton Valley (distillate)	$3.00
Cotton Valley (Holloway crude)	2.95
Texas:	
East Texas	2.90
Chapel Hill	2.83
Conroe	3.13
Van	2.73
Pennsylvania Grade:	
Bradford	†3.85
Middle District	†3.72
Southwest Pennsylvania	†3.43
West Virginia	†3.31
Buckeye Grade	†3.25
Zanesville Grade	†2.92
†Effective December 1, 1955.	
Illinois Basin	3.00
Canada:	
Leduc-Woodbend (flat prices D-2, D-3)	2.60
Redwater (Alta.) D-3	2.49
Smiley-Viking (Sask.)	2.26
Fosterton (Sask.)	1.29
Pembina	2.52

FOREIGN

Venezuela:	
Cumarebo, 48°-48.9°, Tucupido	*$3.40
San Joaquin, 41°-41.9°, Puerto La Cruz	*3.04
Oficina, 35°-35.9°, Puerto La Cruz	*2.80
Tia Juana medium, 26.5°-26.9°, Amuay	‡2.30
Quiriquire, 16.5°-16.9°, Caripito	‡2.21
Lagunillas heavy, flat, Amuay or Las Piedras§	2.05
Bachaquero, 16.5°-16.9°, Amuay or Las Piedras§	‡1.90

*Plus or minus 2 cents per barrel for each degree gravity change. †Plus or minus 2.5 cents per barrel for each half-degree gravity change. ‡Plus or minus 3.5 cents per barrel for each half-degree gravity change. §Also available at La Salina at 3.0 cents per barrel less.

Middle East, Persian Gulf (cargoes, f.o.b. lifting port):	
Arabian, 36.0°-36.9°, Ras Tanura	1.97
Iranian, 34.0°-34.9°, Bandar Mashur	1.91
Iranian, 34.0°-34.9°, Abadan	1.86
Iraq, 36.0°-36.9°, Fao	1.92
Kuwait, 31.0°-31.9°, Mina-al-Ahmadi	1.72
Qatar, 39.0°-39.9°, Umm Said	2.06
Middle East, E. Mediterranean:	
Arabian, 36.0°-36.9°, Sidon	2.39
Iraq, 36.0°-36.9°, Tripoli, Banias	2.39
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Lab Petro-chem furnace 50,000 BTU/hr.
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200,000 ft.—12¾" O.D. x .375 Wall, 49.56# Lapweld, All Machine Cleaned, Straight, App. 30' SRL, Ends Beveled, Used Good Condition.

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Work will include process engineering closely integrated with operations of new independent refinery which includes crude distillation; catalytic cracking, reforming, polymerization; delayed coking and sulphur manufacturing.

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BOX J-327,
THE OIL AND GAS JOURNAL,
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Active independent oil company has vacancies for graduate petroleum engineers with two to five years of practical experience in drilling and production in West, West Central or North Texas. Excellent opportunities for growth and advancement. Replies should furnish complete personal data, education, experience, and starting salary desired.

BOX J-300,
THE OIL AND GAS JOURNAL,
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Candidates should be graduate engineers not over 35 years of age. Broad background of at least five years experience with oil refinery equipment desired.

Give full and specific details of education, experience, desired salary, availability date and references.

All inquiries will be considered promptly and held confidential.

Esso Research and Engineering Company
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P. O. BOX 51 LINDEN, N. J.

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Graduate engineer for general refinery engineering work. Good knowledge required of refinery mechanical equipment and some knowledge of steel and concrete design. Minimum experience five years.

Salary commensurate with training and experience. Replies should give complete personal data, education, experience, salary requirement. Your reply will be held strictly confidential.

MECHANICAL ENGINEER
NATIONAL COOPERATIVE REFINERY ASSOCIATION
McPherson, Kansas

SITUATIONS WANTED

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GEOLOGICAL ENGINEER—Four years sub-surface mapping, evaluation, well sitting—Gulf Coast and South Texas; Age 32. Desires position with independent having active drilling and development program. Resume sent on request. Box J-341, The Oil and Gas Journal, Tulsa, Oklahoma.

REFINERY SUPERINTENDENT, executive assistant, technical co-ordinator. Proven administrator. 18 years experience including cat. cracking and reforming. Degree. Box J-345, The Oil and Gas Journal, Tulsa, Oklahoma.

GEOPHYSICIST: Nine years seis. experience Mid-Continent and Southwest. Box J-344, The Oil and Gas Journal, Tulsa, Oklahoma.

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CHEMICAL ENGINEER, 29, married, 3 years laboratory, 1 year diversified refining experience. Desires process or operations work. Box J-342, The Oil and Gas Journal, Tulsa, Oklahoma.

SEISMOGRAPH Supervisor over twenty years wide areal experience all phases operations and interpretation, employed, seeking situation with greater permanency, major oil company or stable independent. Box J-322, The Oil and Gas Journal, Tulsa, Oklahoma.

MAINTENANCE ENGINEER—B.S. degree in C.E. presently employed with major oil company in South America. Desires change to other company foreign or domestic. Experienced in F.C.C.U., as well as other refinery plants. Capable of planning and executing all maintenance and new construction. Capable design engineer. Box J-314, The Oil and Gas Journal, Tulsa, Oklahoma.

SITUATIONS WANTED

GEOLOGIST, seven years major company experience, Louisiana, Mississippi and East Texas, desires employment in one of these areas. Preferable with small company or independent. Box J-318, The Oil and Gas Journal, Tulsa, Oklahoma.

PETROLEUM ENGINEER—33, employed, registered, 9 years with major. Desires position having advancement opportunities with small major, independent, or consulting partnership. Box J-317, The Oil and Gas Journal, Tulsa, Oklahoma.

INSTRUMENT Department Supervisor desires responsible position in the instrumentation field. Qualified in measurement and control of flow, temperature, pressure, liquid level, pH, conductivity. Several years experience. College graduate. Please write to Box J-330, The Oil and Gas Journal, Tulsa, Oklahoma.

MAILING LISTS

MAILING LISTS

Royalty Investors. Other oil lists. Oil Industry Mailing List Co., 405 Tuloma Bldg., Tulsa, Okla.

LEGAL NOTICE

NOTICE OF SALE OF OIL, GAS AND SULPHUR LEASE

Pursuant to the provisions of Chapter 150 of the General and Special Laws of the State of Texas, passed by the 45th Legislature at its Regular Session, as amended by Senate Bill No. 248, passed by the 53rd Legislature at its Regular Session, the Board of Directors of the Agricultural and Mechanical College of Texas hereby offers for sale at public auction in the Office of the Comptroller, Room 201-D, System Administration Building, College Station, Texas, at 10:00 a. m. Thursday, February 23, 1956, the oil, gas, and sulphur lease on one hundred fifty-five and forty-nine one hundredths (155.49) acres of land, more or less, being all of Lots 7 and 8, containing 18.18 acres each, and Lots 9, 10, 23, 24, 25 and 26, containing 20 acres each; less and except eighty-seven one hundredths (0.87) acres off the southeast corner of Lot 8, in the Theodore S. Lee Survey, Abstract 316, as laid off for the New York and Texas Land Company, Ltd., by J. A. Donaldson, County Surveyor of Brazoria County, and being the same land conveyed to the State of Texas by G. M. Henderson by deed dated January 11, 1911, recorded in Volume 103, Page 153, of the Deed Records of Brazoria County, Texas, to all of which reference is here made for all purposes. Only cash bids will be considered. The right is reserved to reject any and all bids. For lease forms and particulars, address COMPTROLLER, Texas Agricultural and Mechanical College System, College Station, Texas.

WANTED

WANTED: Producing royalties. Send report and full information to: C. A. Awalt, 511 Century Building, Fort Worth, Texas.

OIL PROPERTIES WANTED. "Oil properties wanted, settled or semi-settled production of 100 to 2,500 barrels daily in Oklahoma and Kansas. Property must stand thorough inspection. Contact Morris Sitrin, 1215 First National Building, Tulsa, Oklahoma with particulars.

WANT TO BUY

100 to 2000 bbls. or more daily settled production. Texas-Okla. Immediate attention. Confidential.

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Oil companies with substantial reserves for merger or outright purchase. Interested also in large producing properties, secondary recovery prospects and large mineral holdings either productive or non-productive. Our engineers are capable of evaluating your properties on a completely confidential basis. No commissions need be paid. You deal only with the principals. Write, wire or phone LU 4-2471.

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LEASE AND DRILLING BLOCKS

CONTACT A L. Bowles, Box 947, Ada, Okla., for Drilling Deals, Oil Production.

WILL LEASE my West Texas land for oil or uranium prospecting. Box 419, Upland, California.

160 A. OIL LEASE, eastern Utah, center of activity, near gas. R. Barnsley, 950 Lincoln Ave., Palo Alto, Calif.

OWN 460 ACRES in South eastern Kansas. Want someone to drill. E. A. Tanquary, P. O. Box 97, Stanley, Kansas. Phone Olathe 2146W4.

CAPITAL WANTED to drill shallow wells in oil seepage areas or will sell leases. Contact E. A. Munyan, 102 Fairview Drive, Fairfax, Va.

KANSAS WATER FLOOD; 900 acres near Chanute, 3 oil wells, 2 injection wells, 600 ft. depth, pressure pumps, tanks etc. Sell or take partner. (Owner) O'Chamis, 10863 Bluffside Drive, No. Hollywood, Calif.

CHOICE URANIUM PROPERTIES and other minerals available. GENERAL MINING COMPANY. Uranium—Minerals—Petroleum—Exploration—Development. Geological and Engineering Surveys. 144 N. Market St. P. O. Box 55, Phone 278, Cortez, Colo.

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BUSINESS OPPORTUNITIES

NEED PARTNER with $300 to finance development of ten uranium claims on 50-50 basis. Good Assay. Write for details and map. Box 162, Heavener, Oklahoma.

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Delaware Corporations formed and serviced. American Guaranty & Trust Company, P. O. Box 487, Wilmington, Delaware

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1. Companies with Production
2. Producing Properties

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All replies strictly confidential.

Box J-346,

The Oil and Gas Journal,
Tulsa, Oklahoma.

Equipment Men

Bradford Supply Represents Stardrill-Keystone in East

Stardrill-Keystone Co., Beaver Falls, Pa., has announced the appointment of a new distributor in Indiana, Illinois, Kentucky, and Tennessee. Bradford Supply Co., with main offices at Bradford, Pa., will distribute Stardrill-Keystone machines throughout this territory. Bradford had already held distribution rights in eastern New York and northern Pennsylvania.

With completely equipped shops at Bolivar, N. Y., Bradford, Pa., Robinson, Ill., Owensboro, Ky., and Wichita Falls, Tex., Bradford is well qualified to provide the best service and facilities. In addition to these shops, Bradford maintains sales offices in the new territory at Princeton, Ind., Auburn, Salem and El Dorado, Ill. C. D. Chamblin, district manager of the area newly represented by Bradford, makes his headquarters at Robinson.

Bethlehem to Build Vessel For Offshore Operations

The Bethlehem Shipbuilding Yard at Beaumont, Tex., has received a contract from Penrod Drilling Co. of Shreveport, La., to build a portable, submersible, self-stabilizing elevated-deck drilling vessel for service offshore in the gulf.

The new unit, generally a sister ship of the S-55 being built for The California Co., is to the designs and specifications of Friede & Goldman, Inc., naval architects. Like the S-55, the new Penrod Unit was designed to operate in 75 ft. of water in the open sea.

The vessel was designed in accordance with principles developed by the naval architects and brings to seven the number of units designed by the same firm, now building in three Gulf Coast shipyards, and the first to be built by Bethlehem to Friede & Goldman design.

Penrod Drilling Co. is one of the Hunt interests, controlled from Dallas, Tex.

M-H Adds 21 to Sales Posts in 19 Offices

Twenty-one new sales engineers have been added to the field sales force of Minneapolis-Honeywell Regulator Co.'s Industrial Division, it was announced by J. A. Robinson, field sales manager. They were assigned to 19 branch offices located in 18 U. S. cities and one Canadian city.

The new sales engineers, all graduates of the division's training school's twentieth anniversary class, include: William Bater and Robert W. O'Reilly, Philadelphia; David B. Beasley, Toronto; Walter E. Biewer and Robert E. Day, Los Angeles; Robert J. Byers, Milwaukee; A. P. Ciprari, International Division, New York; Alan L. Colter, Buffalo; John L. Dyer, Cincinnati; Merton H. Fischer, International Division, Minneapolis; Michael N. Francher, Syracuse; Eugent D. Haugen, Seattle; Charles C. Hulsey, Columbus; Charles B. MacRae, Houston; Robert J. Owen, Cleveland; John B. Prouty, Columbus; Harvey F. Renee, Indianapolis; Bertram R. Robinson, Union; Russell W. Skinner, Pittsburgh; Jack D. Stickley, Oklahoma City; and Richard E. Swenson, Twin City.

Griffin Joins Procon In Great Britain

Lawrence M. Griffin is now employed by Procon, Inc., of Des Plaines, Ill. Formerly with Southwestern Engineering Co., Griffin will report to Procon (Great Britain), Ltd., an affiliate company of Procon, Inc., for work on the Continent. He is a mechanical engineer and has sold refinery equipment for years in the western United States.

LEGAL

U. S. DEPARTMENT OF THE INTERIOR, Bureau of Land Management, Washington 25, D. C. Notice is hereby given that 21.82 acres of land within the known geologic structure of Pine Island field, Louisiana, will be offered for oil and gas leasing through competitive bidding to the qualified bidder of the highest cash amount per acre at 1:00 p.m., E.S.T., February 15, 1956, when bids will be opened. Details of the lease offering, description of the land, how and where to submit bids and bid forms may be obtained from the Acting Manager, Eastern States Land Office, Bureau of Land Management, Washington 25, D. C. Charles P. Mead, Acting Manager.

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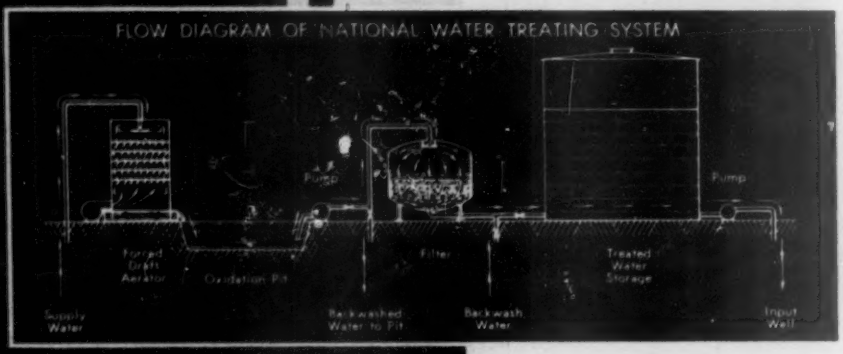
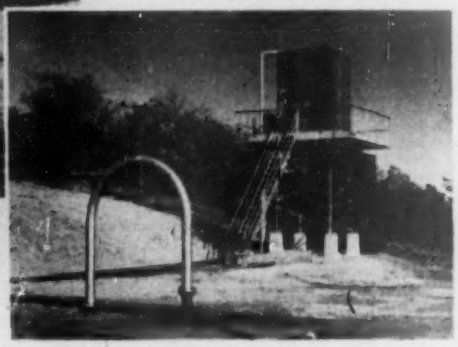


Two National Aerators in series with water supply well located north of Tulsa, Oklahoma.



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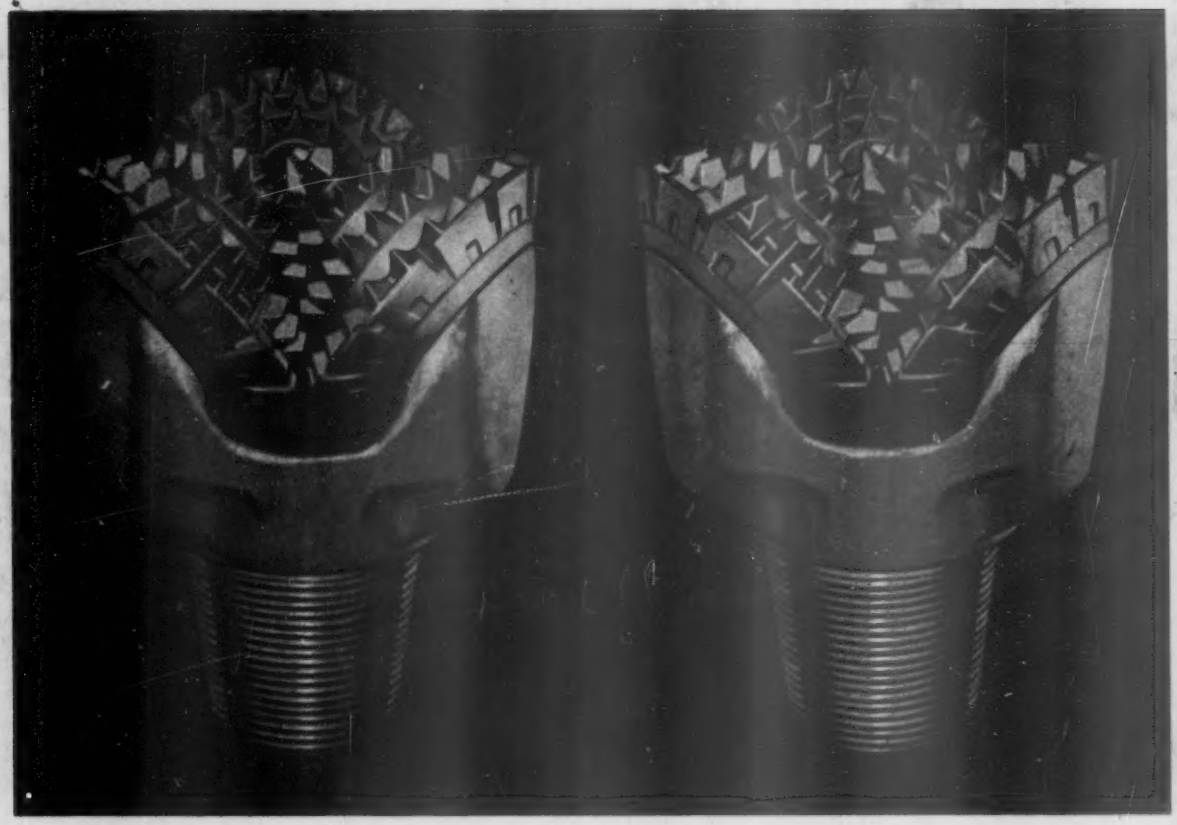

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